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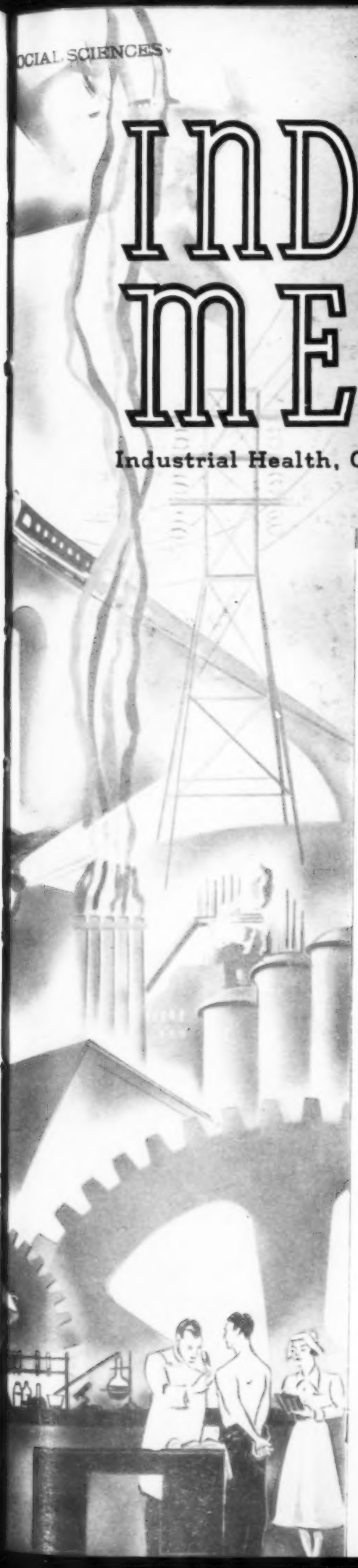
# INDUSTRIAL MEDICINE

Industrial Health, Occupational Diseases and Traumatic Surgery



March, 1943

**Cases Gassed with Nitrous Fumes**
— A Method for Handling —

**Tuberculosis Case Finding**
— Through Mass Survey —

**Control of Health in Industry**
— Keeping Men Well —

**Industrial Injuries**
— Their Surgical Management —

**Skin Hazards**
— In the Manufacture of Glass Wool and Thread —

**Who Can Work?**
— Plea for the Handicapped —

**Rehabilitation**
— Recent Developments in Connecticut —

**Health Hazards in Welding**
— A Review —

**The Mental Health of Workers**
— A Dark Corner of Industrial Medicine —

**The Pre-Employment Physical Examination**
— As an Aid to a Construction Company —

**Fractures**
— About the Ankle —

**War Conference**
— Industrial Physicians and Hygienists at Rochester in May —

Volume 12 Number 3

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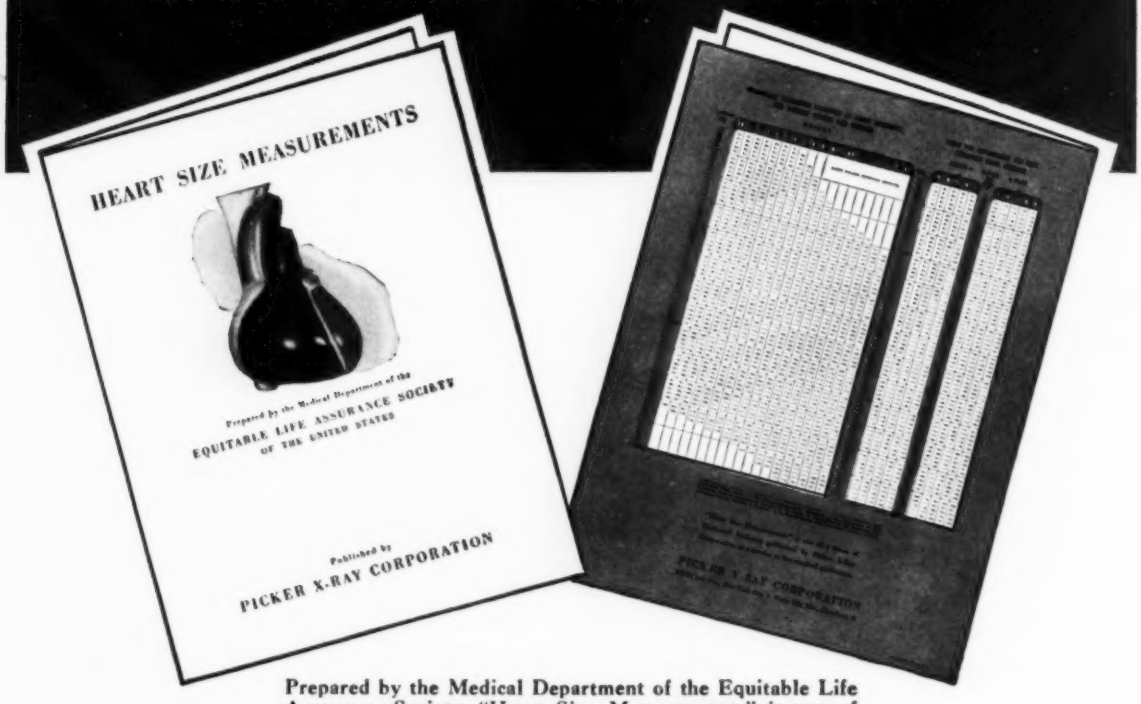


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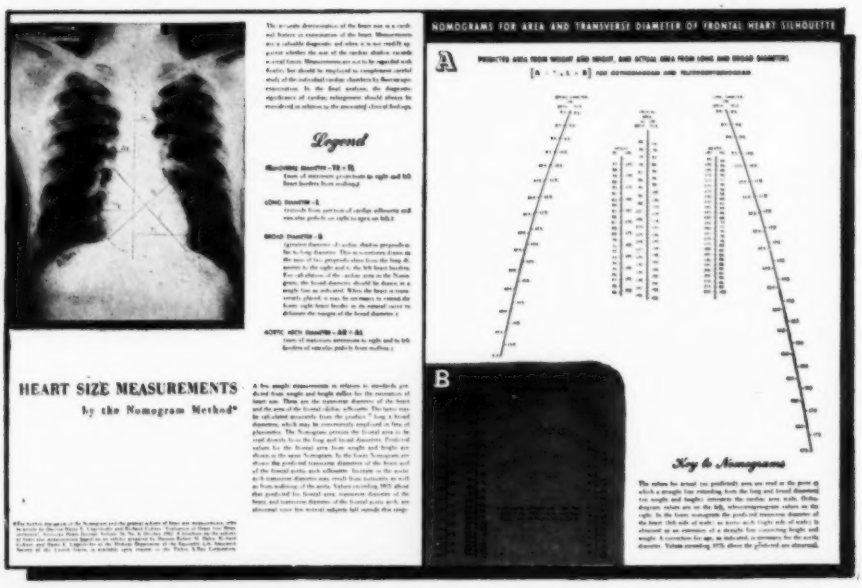


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& RAILROAD SURGERY

Industrial Medicine | Volume 12 | MARCH, 1943 | Number 3 | Industrial Medicine


## This Month


CASES Gassed with Nitrous Fumes.....*A. J. Fleming, M.D.* 127
—A Method for Handling
CARBON Tetrachloride..... 133
—Colloquy on Susceptibility
TUBERCULOSIS Case Finding.....*Irving R. Tabershaw, M.D.* 133
—Through Mass Survey
CONTROL of Health in Industry.....*John H. Foulger, M.D.* 136
—Keeping Men Well
INDUSTRIAL Injuries.....*John J. Moorhead, M.D.* 140
—Their Surgical Management
SKIN Hazards.....*Louis Schwartz, M.D.* 142
—In the Manufacture of Glass Wool and Thread
(With *Isadore Botvinick, M.D.*)
WHO Can Work?.....*D. L. Lynch, M.D.* 145
—Plea for the Handicapped
REHABILITATION.....*James H. Biram, M.D.* 146
—Recent Developments in Connecticut
THE MENTAL Health of Workers.....*Meyer Brown, M.D.* 148
—A Dark Corner of Industrial Medicine
HEALTH HAZARDS in Welding.....*Cemal Kiper, M.D.* 150
—A Review
THE PRE-EMPLOYMENT Physical Examination.....*W. H. D. Hinchman* 153
—As an Aid to a Construction Company
SIXTY YEARS in Practice..... 154
—A Railroad Surgeon's Career
WAR CONFERENCE..... 155
—Industrial Physicians' and Industrial Hygienists'
Joint Annual Meeting at Rochester, New York, May 24-27, 1943
EDITORIAL: (War Conference) (Absenteeism in the News)..... 156
FRACTURES.....*E. P. Gillette, M.D.* 160
—About the Ankle
PSYCHIATRY.....*Lydia G. Giberson, M.D.* 164
—In Personnel Work
NUTRITION in Industry..... 172
—Securing Preliminary Information
WARTIME Industrial Services..... 174
—The Permanente Foundation; California
Physicians' Service; Procurement and Assignment
INDUSTRIAL HEALTH and DISEASE:
THE INDUSTRIAL Worker.....*Alma Ebling* 178
—His Eyes
LOW BACK Pain.....*W. Horace Means, M.D.* 180
—of Industrial Workers
ABSENTEEISM in Great Britain..... 183
EPIDEMIC Kerato-Conjunctivitis.....*Clifford Kuh, M.D., Dr. P.H.* 184
—"Shipyard Eye"

Personal News.....6 General News.....14
Comment and Opinion.....22


### WAR CONFERENCE

**American Association of Industrial Physicians and Surgeons**
(Twenty-Eighth Annual Meeting)

**American Industrial Hygiene Association**
(Fifth Annual Meeting)

**National Conference of Governmental Hygienists**
(Sixth Annual Meeting)

**May 24-27, 1943 Rochester, N. Y.**

DR. FLEMING's "Cases Gassed with Nitrous Fumes" (page 127) discloses not only an exhaustive study of the literature, but also, and more important, the development, from original research, of a procedure that is certain to be of practical value. The number of these cases is increasing, and there are such serious gaps in the published material as to leave many industrial physicians at a loss how to deal with them. The information here presented will save time and risk in the handling of such cases, a matter of primary importance at this time. The disclosures of this article aroused keen interest at a recent special conference of medical directors of war explosives plants and public health service officers. . . . THE colloquy on susceptibility to carbon tetrachloride (page 133) is timely because of the increasing number of distressing experiences with exposures of less than the usually accepted limit of 100 p.p.m. Of that, however, more later. . . . DR. TABERSHAW's "Tuberculosis Case Finding" (page 133) presents, studiously and effectively, the many benefits of a long-range tuberculosis discovery program. . . . DR. FOULGER's "Control of Health in Industry" (page 136) and DR. MOORHEAD'S "Industrial Injuries" (page 140) embrace the


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## THIS MONTH


Alba Pharmaceutical Division ..... 7
*Announcement of Consolidation*

Alkalol Company, The ..... 178
*Alkalol*

Aloe, A. S., Company ..... 44
*Industrial Medical Installations*

American Optical Company ..... 27
*AO Goggles; AO Service*

American Sterilizer Company ..... 35
*Hygeaire Ultraviolet Units*

Anacin Company ..... 45
*Anacin*

Bauer & Black ..... 25
*Curity Sorbant Gauze*

Baum, W. A., Co., Inc. ..... 52
*Blood Pressure Apparatus*

Becton, Dickinson & Co. ..... 34
*B-D Syringes*

Bovinine Company, The ..... 158, 159
*Vitules*

Bristol-Myers Company ..... 171
*Sal Hepatica*

Burdick Corporation, The ..... 32
*Physical Therapy and X-Ray*

Cambridge Instrument Co., Inc. ..... 40
*All-Electric Electrocardiograph*

Camp, S. H., & Co. ..... 161
*Camp Supports*

Carbisulphoil Company ..... 49
*Foille*

Ciba Pharmaceutical Products, Inc. 4th Cover
*Privine Hydrochloride*

Denver Chemical Mfg. Co., The ..... 28
*Antiphlogistine*

Desitin Chemical Company ..... 50
*Desitin Ointment*

Dixie Vortex Company ..... 23
*Dixie Cups and Containers*

Dome Chemicals, Inc. ..... 30
*Domeboro Tabs*

Drug Products Co., The ..... 176
*Sclorea Emulsoid*

Effervescent Products, Inc. ..... 38
*Clinitest*

Endocrine Food Company ..... 164
*BeCoTabs*

Fidelity Medical Supply Co., The ..... 174
*Sulfathiazole Urea Ointment*

Flint, Eaton & Company ..... 16
*Sulfonamides*

Gebauer Chemical Company, The ..... 168
*Gebauer's Tannic Spray*

General Electric X-Ray Corporation ..... 163
*G-E Inductotherm*

Hanovia Chemical & Mfg. Co. ..... 53
*Hanovia Health Lamps*

Hart Drug Corporation ..... 22
*Pharmaceutical Products*

Health Cigar Co., Inc. ..... 12
*Sano Cigarettes*

Holland-Rantos Company, Inc. ..... 167
*"The Koromex Set Complete"*

Hotel Lincoln ..... 174
*(New York City)*

Hynson, Westcott & Dunning, Inc. ..... 168
*Crystalline Sulfanilamide*

Industrial Medicine Book Co. ..... 176
*"The Mind of the Injured Man"*

Johnson & Johnson ..... 1, 37, 162
*Steripads; Plaster; Bandage*

Lederle Laboratories, Inc. ..... 179
*Sulfadiazine*

Leeming, Thos., & Co., Inc. ..... 26
*Baume Bengué Analgésique*

Lilly, Eli, and Company ..... 54
*"Machines that Seldom Stop"*

Lever Brothers Co. ..... 19
*Vimms*

McNeil Laboratories ..... 2nd Cover
*Tablets Aspirocal Comp.*

Merck & Co., Inc. ..... 11, 175
*Sulfa Compounds; Cuprex*

Merrell, The Wm. S., Company ..... 10
*Nitranitol*

Milburn Company, The ..... 17
*"The Answer to Industrial Dermatitis"*

Mine Safety Appliances Company ..... 24
*M-S-A Fend*

National Drug Company ..... 160
*Allantomide*

New York Medical Exchange ..... 6
*Personnel Placement*

New York Pharmaceutical Company ..... 169
*Hayden's Viburnum Compound*

Norwich Pharmacal Company, The ..... 42
*Unguentine*

Nutrition Research Laboratories ..... 15, 46, 47
*Pendron; Ertron*

Ortho Products, Inc. ..... 173
*Ortho-Creme*

Packwood, G. H., Manufacturing Co. ..... 8
*Pax Industrial Skin Cleanser*

Parker, White & Heyl, Inc. ..... 21
*Bard-Parker Germicide*

Patch, The E. L., Company ..... 170
*Gadoment*

Pelton & Crane Co., The ..... 20
*Pelton Sterilizers*

Petrogalar Laboratories, Inc. ..... 41
*Petrogalar*

Picker X-Ray Corporation ..... 2
*"Heart Size Measurements"*

Pineoleum Co., The ..... 166
*Pineoleum*

Powers X-Ray Service ..... 18
*Rapid Chest X-Ray*

Reed & Carnrick ..... 29
*Nephritin*

Resinol Chemical Co. ..... 170
*Resinol Ointment*

Reynolds, R. J., Tobacco Company ..... 165
*Camel Cigarettes*

Sarnay Products, Inc. ..... 169
*Korium (Fungicide)*

Schering Corporation ..... 181
*Solganal-B Oleosum*

Schuylkill Chemical Co. ..... 14
*Sulfallantoin*

Searle, G. D., & Co. ..... 9
*Aminophyllin*

Sharp & Dohme ..... 5
*"Esdavite" Pearls*

Sklar, J., Manufacturing Co. ..... 48
*Surgical Instruments*

Squibb, E. R., & Sons ..... 157
*Pargran-V and Pargran-M*

Stearns, Frederick, & Company ..... 31
*Neo-Synephrine Hydrochloride*

Strasenburgh, R. J., Co. ..... 36
*Strasco Special Vitamin Program*

Towns, Charles B., Hospital ..... 170
*Alcoholism and Drug Addiction*

Wallace & Tiernan Products, Inc. ..... 13
*Azochloramid*

Wander Company, The ..... 43
*Ovaltine*

West Disinmecting Company ..... 33
*Lan-O-Kleen; Wescol; Creams*

White Laboratories, Inc. ..... 3rd Cover
*Vitamin A & D Ointment*

Whittaker Laboratories, Inc. ..... 10
*Cooper Creme*

Winthrop Chemical Company, Inc. ..... 51
*Betaplexin*

Wyeth, John, & Brother, Inc. ..... 39
*Elixir B-Plex*


subject matter of certain of their lectures in Long Island College of Medicine's recent Post-Graduate Course in Industrial Medicine. The authoritative backgrounds of these men, and the vitality and forthrightness that persist in the transcripts of their presentations, emphasize still more the unusually fine scope and valuable qualities of that Course in general; prove, once more, that it was even better in performance than in program (itself a remarkable achievement); and enhance the regret of many who missed it that they couldn't have been there to profit twice—from the personalities as well as the presentations. It is not only hoped, but also strongly urged, that this Course be repeated as soon and as often as possible. . . . DR. SCHWARTZ's "Skin Hazards, in the Manufacture of Glass Wool and Thread" (page 142) adds another to his already long list of important contributions on the subject wherein he qualifies as top-ranking expert. . . . DR. LYNCH ("Who Can Work?"—page 145) pleads for the handicapped—forcefully and eloquently, but still with such a suggestion of understatement as to inspire the wish that he could find the time (we know he has the interest) to go all the way with the subject, book length, if necessary. His work would find wide reading. . . . DR. BIRAM's "Rehabilitation" (page 146) describes one of the most important developments in industrial medicine of recent years. It deserves careful study, for the reasons, among others, of its intrinsic merit, its far-reaching possibilities, and the fact that behind it, as originator, is a keen, original, experienced, and very practical mind. . . . DR. BROWN's "Mental Health of Workers" (page 148) pointedly emphasizes that the employee, submitting to an ever-increasing study of his body as an element of the safety of his work, brings also his mental make-up. The one is as fearfully and wonderfully composed as the other, and the disorders of both are of equal importance. . . . DR. KIPER, who reviews "Health Hazards in Welding" (page 150) has a Master's degree at Harvard School of Public Health, and is doing research work at Harvard. He plans to return to his native land, as soon as may be, and take up his position in the School of Hygiene at Ankara. . . . MR. HINCHMAN's "Pre-Employment Physical Examination" (page 153) is a remarkable example of what can be done when management in the smaller industries gets really interested. The "follow-up" is instructive, in both manner and results. . . . WHILE the meeting in Washington 26 years ago, mentioned in the "WAR CONFERENCE" editorial (page 156), is documented in the history of the first World War, the participation of the AMERICAN ASSOCIATION OF INDUSTRIAL PHYSICIANS AND SURGEON'S, organized in 1915, is mostly a matter of memory. DR. W. A. EVANS, one of the founding members, recalls that the A. A. I. P. & S. furnished practically the entire personnel of the Advisory Board, or Committee, on Industrial Hygiene provided at that time by the Surgeon-General's office; he was its chairman. The first chapter of the Association's history was written then; another is being written now. The proper and permanent documentation of both—and all between—is getting off to a good start under the direction of DR. SHOUDY's History Committee. . . . DR. GIBERSON's "Psychiatry in Personnel Work" (page 164) is from the journal of the Society for Personnel Administration. The journal's editor comments: "The contributions which psychiatry can make to effective personnel administration are presented by LYDIA G. GIBERSON, M.D., Industrial Psychiatrist, Metropolitan Life Insurance Company. No doubt modesty—certainly not lack of

*—Continued on page 187.*

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1. J.A.M.A. 110:2072, 1938—2. J. Nutrition, 15:547, 1938

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## PERSONAL

DR. RICHARD J. BENNETT, JR., has been appointed chief surgeon, Chicago district, Carnegie-Illinois Steel Corporation, succeeding DR. PHILIP H. KREUSCHER, who is retiring to devote all his time to private interests. DR. BENNETT has been connected with the United States Steel Corporation since January 1, 1937, when he was appointed associate chief surgeon.

CHRISTOPHER LEGGO, Surgeon (R), and JOSEPH E. FLANAGAN, JR., Passed Assistant Industrial Hygiene Engineer (R), have reported for duty with the Industrial Hygiene Division of the Ohio State Department of Health, at Columbus.

DR. RAYMOND HUSSEY, associate professor of medicine, Johns Hopkins University School of Medicine, Baltimore, member of the A.M.A. Council on Industrial Health, and lately identified with the movement to educate general practitioners in industrial health, has been appointed scientific director of the new Army Industrial Hygiene Laboratory at Johns Hopkins University School of Hygiene and Public Health. The laboratory will operate under the direction of the occupational hy-

Patricia Edgerly-

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# Announcement of Consolidation

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## PHARMACEUTICAL COMPANY, INC.

★

ON December 31, 1942, Alba Pharmaceutical Company, Inc., was consolidated with Winthrop Chemical Company, Inc. This merger makes possible the more effective use of the combined manpower, research facilities and manufacturing installations, without any sacrifice of high standards.

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★

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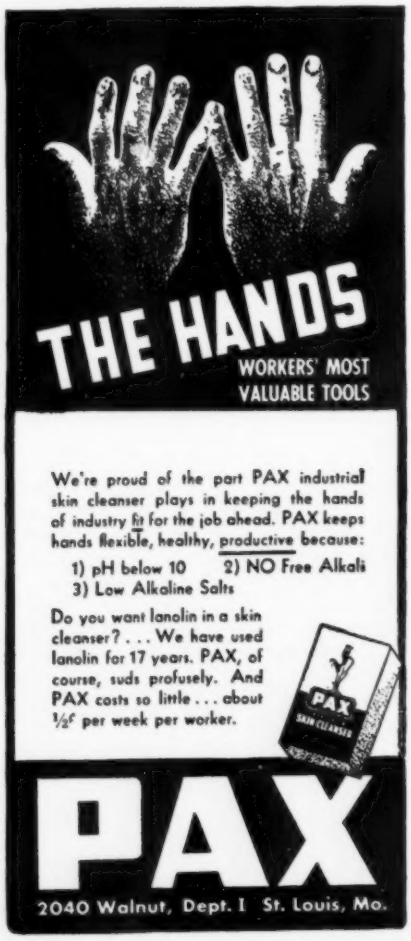
DR. LOUIS SCHWARTZ, medical director, U. S. Public Health Service, spent most of two days investigating reports of the spread of skin ailments among shipyard workers handling certain kinds of electric cable. DR. SCHWARTZ assured both workers and management officials that no cause exists for alarm—provided that simple hygienic measures are taken. DR. LLOYD FARNER, chief of the division of industrial hygiene of the State Health Department, said that, although several hundred cases of the ailment had been reported,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—*Seattle, Wash., Times*, January 12.

DR. D. OLAN MEEKER, has been appointed medical director of the National Drug Co., of Philadelphia. He is a Diplomate of the National Board of Medical Examiners, a member of the A.M.A., the Medical Society of New York County and the Society of American Military Engineers, and well known in the medical field for his original research, particularly in biological chemistry.

DR. ERWIN D. SIMINSON has been appointed chief surgeon of the New York Central System at Chicago, succeeding DR. FRANK E. PIERCE, chief surgeon since 1908, and now retired. DR. SIMINSON has been with the New York Central since 1925, as assistant to DR. PIERCE.

DR. CHARLES-EDWARD A. WINSLOW, Anna M. R. Lauder professor of public health at Yale University School of Medicine, was awarded the William Thompson Sedgwick Memorial Medal at the recent annual meeting of the American Public Health Association held in St. Louis, Missouri. This medal is for distinguished service in public health.

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DR. THOMAS D. DUBLIN, epidemiologist in the division of communicable diseases of the New York State Department of Health, has been appointed head of the department of preventive medicine and community health at Long Island College of Medicine.

DR. STANLEY J. SEEGER, of Texarkana, Texas, chairman of the council on industrial health, said that the A.M.A. has been long preparing for the protection of industrial health and that it is not longer possible to excuse failure to have a properly developed program by criticizing the physician.

—JAMES C. LEARY, in *Chicago Daily News.*

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By cupping the dam, Sulfallantoin powder sprinkled in it is carried directly into the wound. The wound is then dressed with sterile gauze, and remains so for several days, depending upon the amount of drainage.

When infection subsides or drainage ceases, the upper end of the rubber dam is cut to permit that opening to heal. The lower end remains open for any residual drainage. The remaining portion of the rubber dam is shortened daily and removed when healing is complete. This procedure is often followed in hematomas.

*Koerber, Kenneth A., A.B., M.D., et al., Medical Department, Cramp Shipbuilding Co., Philadelphia: "Sulfallantoin in Industrial Medicine," INDUSTRIAL MEDICINE, October, 1942.

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Infectious ulcerations of all types
2nd and 3rd Degree Burns
Osteomyelitis
Infected Wounds
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**Available in Two Forms**

POWDER. This white crystalline powder is packed in ¼ and 1 ounce vials ready for dusting. Solution can be made in distilled water or physiological saline solution for wet dressings. Generally used in strength between 0.5 to 0.8%.

2% OINTMENT in a soothing Special Absorption base is rapidly and completely absorbed. Does not leave a dry, cracked surface or cause bandages to adhere. Will absorb considerably in excess of its own weight in water. 1 ounce, 2 ounce and 14 ounce jars.

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Health Advisory Council to consider national health problems in relation to the war program. DR. JAMES S. MCLESTER, professor of medicine, University of Alabama School of Medicine, was made general chairman. The new council will serve to channel approved technical health information developed by the country's many scientific associations to business organizations and their members throughout the country so there may be brought about a better public understanding and appreciation of medical science as a means of safeguarding public health to win the war. It will work through the Chamber of Commerce of the United States as a central organization, which in turn will work through its membership of trade associations, chambers of commerce and corporations and firms. Membership of the council, which will be increased as work progresses, has been divided into three groups—community, industrial and individual. DR. WILSON G. SMILLIE, New York, is chairman of the community group; DR. JAMES E. PAULLIN, Atlanta, Georgia, of the individual group; and DR. LEVERETT D. BRISTOL, New York, of the industrial group. The latter comprises: DR. HARVEY BARTLE, Pennsylvania Railroad, Philadelphia; DR. ANTHONY J. LANZA, Chief, Occupational Hygiene Section, Office of Surgeon General, U. S. Army, Washington, D. C.; DR. JOHN J. PRENDERGAST, Medical Director, Chrysler Corporation, Detroit; DR. LOYAL A. SHOUDY, Bethlehem Steel Corporation, Bethlehem, Pennsylvania; DR. WILLIAM A. SAWYER, Medical Director, Eastman Kodak Company, Rochester, New York; JOHN D. DORSETT, Manager Casualty Department, Association of Casualty & Surety Executives, New York; PROF. PHILIP DRINKER, PH.D., Harvard University; DR. HARRY E. UNGERLEIDER, Assistant Medical Director, Equitable Life Assurance Society, New York; DR. JOHN J. WITTMER, Consolidated Edison Company, New York; and G. W. HARDY, Lumbermens Mutual Casualty Company, Chicago.

DR. ALICE HAMILTON, former professor of industrial medicine at Harvard Medical School, has forthcoming her autobiography: "Exploring the Dangerous Trades."

WILLIAM N. WITHERIDGE, Director, Bureau of Industrial Hygiene, Detroit Department of Health, is instructor in the course on "Air Sanitation in Industry," given by University of Michigan, on Tuesdays and Thursdays, in the Rackham Educational Memorial, Detroit. The course covers effective, practical engineering methods of preventing disabling occupational diseases, accidents, or ill health traceable to the atmospheric environment in industry. The prerequisite for entrance is high school graduation plus two years of engineering college or the equivalent in industrial experience.

## GENERAL

OMAHA-DOUGLAS County Medical Society has approved a plan for large scale serologic testing of employees in industry in and around Omaha. When the plans are completed the society will participate by helping to obtain blood from hundreds of employees in the many plants and indirectly, wherever possible, to encourage those of the group whom they know as patients to submit to the test.

INDUSTRIAL HEALTH page in *Minnesota Medicine* for February, under the title "Fitting Workers to Their Jobs," summarized the article "What Are We Examining For?" by DR. T. LYLE HAZLETT, medical director of Westinghouse, which appeared in INDUSTRIAL MEDICINE for December, emphasizing as of special interest the "survey described by DR. HAZLETT of the cardiovascular condition of 692 executives between the ages of 30 and 67 in the Westinghouse employ."

DEPARTMENT of Welfare of New York City calls attention to the need for a centrally organized, decentrally operated, advice and information service for mothers. The Mayor's Committee on Wartime Care of Children agreed that there is a major need for such a service where mothers who are employed in industry or are about to be employed can secure information as to the facilities available for the care of their children. As many as six of these local centers may be established as a beginning.

CHICAGO Ophthalmological Society, at the request of the National Research Council, held a special meeting on Friday, February 19, 1943, to consider the problem of

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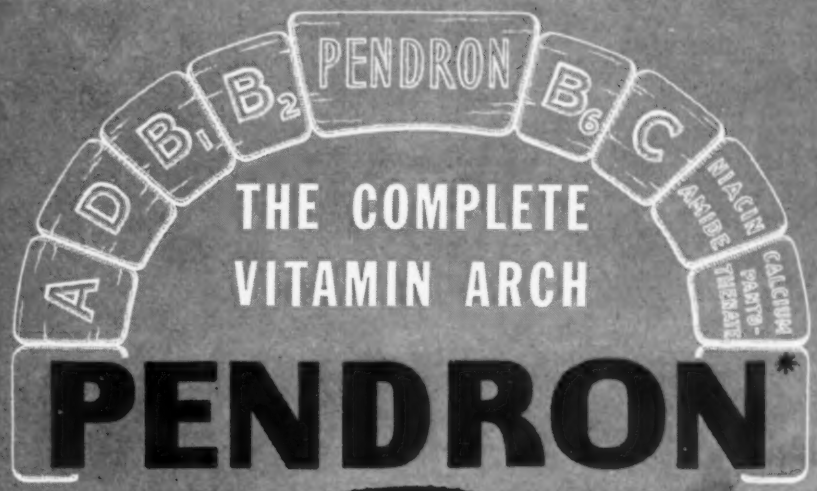


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Sulfanilamide 5% and 10%
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Sulfatoin Emulsion Base Ointment
(Sulfanilamide 10% and Allantoin 2%)

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epidemic kerato-conjunctivitis. In the absence of the president, DR. LOUIS HOFFMAN, the vice-president of the society, DR. F. W. BRODRICK, of Sterling, Illinois, presided. The speaker of the evening was DR. MURRAY SANDERS, assistant professor of bacteriology, Columbia University. He is engaged in a tour of the country at the request of the Surgeon-General of the United States Army, to arouse ophthalmologists and industrial surgeons to the dangers of the epidemic kerato-conjunctivitis which started on the Pacific coast, traveled to the Atlantic coast, and is now manifesting itself in the Middle West.

IN AN X-RAY survey among union workers, 22 cases of tuberculosis were reported out of the first 1,564 persons given x-ray examinations in an effort to determine the extensiveness of tuberculosis carried out by the Erie County Health and Tuberculosis Association. Arrangements were made with the United Electrical, Radio and Machine Workers Local 506 for x-ray examinations of its members and their families, using the rapid paper method. Most of the members were employed at General Electric's Erie plant. Of the total, 14 were found with cardiovascular disease; 22 with other diseases. The analysis information includes age, sex and occupation. The study is being continued for other members.

DETROIT Department of Health has placed kerato-conjunctivitis on its list of reportable diseases. New York City's department of health, on January 12, added to its list of reportable diseases primary atypical pneumonia and kerato-conjunctivitis, the action being taken because primary atypical pneumonia, also known as virus pneumonia, is reported to be increasing throughout the country, and because of the widespread distribution of kerato-conjunctivitis in an epidemic form.

THERE were 320,793 claims filed with the Ohio Industrial Commission during 1942, the largest number ever filed in one year. This figure represents a 12.2% increase over 1941, when 286,010 claims were filed.

MIAMI Copper Company, Miami, Arizona, has established a committee to supervise a trainee program for its women apprentices, the first such program for women mine workers. The company is employing 102 women in the reduction plant, operating lathes, drill presses, etc., and in the boiler and pipe fitting shops; it is expected this number will soon be increased. A change room and lockers for the women workers were recently installed.

I HAVE some rather encouraging news, received in the past two or three weeks, that one of our larger county medical societies will endeavor to sponsor a program for post-graduate education in industrial health for physicians and nurses, utilizing the facilities of the University of Louisville. I believe that will be a tremendous contribution to the improvement of the health of our industrial workers.

—W. E. DOYLE, M.D., director of Kentucky's Bureau of Industrial Hygiene, in *Kentucky Med. J.*, February, 1943.

THE State Superior Court has just .... held, for the first time, that carbon disulphide fumes in rayon plants are a poison which can cause death. "Longtime exposure has injurious effects on the brain and central nervous system, the digestive tract, heart and generative system."

—*Philadelphia Record*, February 7.

AT A SPECIAL conference of New Jersey AFL unions, January 30, LIEUT. JULIUS CASS, of the labor division of the U. S. Army Air Corps, asked the support of the AFL in having present wage and hour laws relaxed to permit women to work more than 54 hours a week in emergencies in war work. He was told the AFL would oppose any effort to repeal or abridge the wage and hours laws, but there would be no objection if the Governor and the Legislature permit "liberal interpretation" of the laws in emergencies during the war. . . . CAPT. R. W. TOWNLEY and LIEUT. L. A. KAGAN, of the Industrial Hygiene Service of the State Department of Health, outlined a program for preserving standards of health among women workers in industry.

—*Newark, N. J., Call*, January 31.

A SYSTEM of industrial dentistry which has been under consideration for months is being installed in the plant of the S. S. White Company, manufacturers of dental supplies, at Princess Bay, S. I. The plan, which is expected to reduce the number of absentees among em-

# THE CLINIC IS A CYNIC!

When airplane engineers proved recently that the flight of the hummingbird is impossible, they had a good laugh at their own expense . . . Aerodynamically, they were right. Clinically, they were wrong before they started, as any hummingbird could have told them.

The clinic is indispensable for its ability to say "No" when the theorist and even the laboratory say "Yes". Behind each PLY protective cream and liquid is a case history of chemical *and* clinical research. On-the-job tests have punctuated and guided the evolution of each product.

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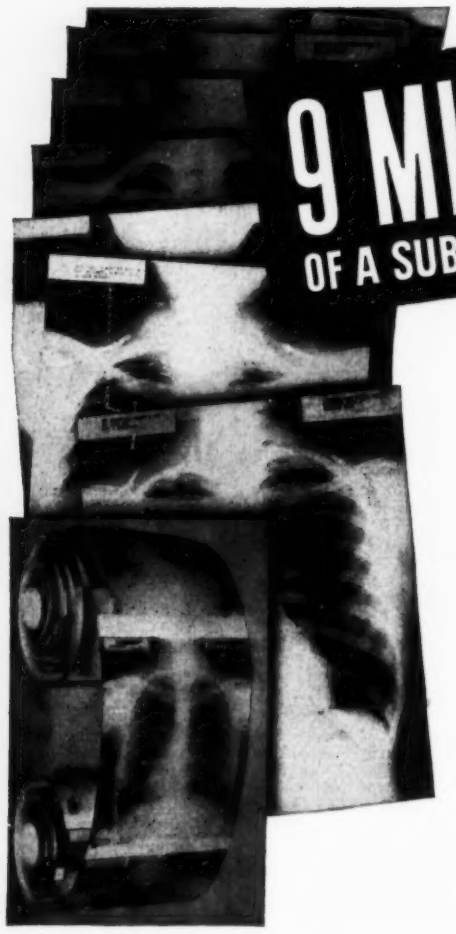


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is just what the name implies. This mobile service offers a most efficient, economical and convenient method of preparing full size chest radiographs of large groups for immediate diagnosis and permanent reference. It is a protective measure for management as well as the individual employee.

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ployees, involves selection of a dental staff equipped to diagnose oral imperfections and care for employees needing emergency dental treatment because of occupational injuries or disabilities, and compulsory oral examination of all candidates for employment. All members of the staff must be qualified professionally, and in good standing with the local dental society.

—*New York Herald-Tribune*, February 9.

DEATH of a 16-year-old girl war worker and hospitalization of five other employees of a New York chemical company who were also overcome by methyl-bromide poisoning, has resulted in permanent closing of the plant, which had a subcontract to fill and seal glass tubes of compound used to combat incendiary bombs.

—*Daily News, N. Y. City*, February 1.

TESTING procedure used by the Navy Department, outlined in their specification No. 51D6(int) for disinfectant, issued May 1, 1942: "F-2d. *Dermatitis*—Both sides of a healthy, adult rabbit, weighing between 2 and 3 kg., shall be clipped and shaved. Three pads of gauze of equal size, and approximately one inch square, shall be prepared. One pad shall be saturated with a 1:10 dilution in water of the disinfectant (solution as supplied) and fastened to one side of the animal. A second pad shall be saturated with a 1:50 dilution in water of liquor dresolis compositus, U.S.P., and the third pad with sterile distilled water. Both of these pads shall be fastened to the other side of the animal. The three pads shall be completely covered with waterproof adhesive tape. At the end of eight hours the pads shall be removed and the areas compared for irritation. The disinfectant under test shall not have caused any more dermatitis than the maximum of the other two patch tests."

RUTGERS University Extension is offering a refresher course in industrial nursing, at Newark. The course is sponsored by the New Jersey Industrial Nurses' Association and the NEW JERSEY ASSOCIATION OF INDUSTRIAL PHYSICIANS AND SURGEONS. Any graduate registered nurse or licensed physician already engaged in industry or those interested in entering this field will be eligible for registration.

THE average stay of patients in the Central Clinical Hospital of People's Commissariat of Railway Workers was 18 days. Hernia and appendicitis operations averaged eight days, confinements seven to eight days. In the entire hospital there was no chloroform or ether; spinal and intravenous anesthesia were used. The Hospital for Industrial Diseases, in Leningrad, was staffed by 103 doctors. Admission was restricted to cases of definite industrial disease; ordinary industrial accident cases were sent elsewhere. Where such specific industrial accidents occur, a doctor, an engineer and a chemist go immediately to the factory. These three technicians examine the situation and no work can start in that section of the factory until their permission has been given. All people in industry are required by law to be examined medically at regular intervals, generally six months.

—From "Doctor and Patient in the Soviet Union," Editorial in *Medical Record*, January, 1943.

THE $500 Research Prize annually offered by the American Urological Association will not be awarded this year. The government has again discouraged the holding of medical conventions, except those primarily of military interest—and at these there is to be a ban on social events. Under the circumstances, plans for the June meeting of the American Urological Association in St. Louis have been cancelled.

AN INDUSTRIAL hygiene physician on the staff of a State Department of Health has attempted an appraisal of the work of industrial nurses in his own state. He has listed the accomplishments of one such nurse in a comparatively small plant—all within the first month of service. Here are some of the things she did: (1) brought about the transfer of a worker from a machine which he could not operate properly,

# The "Blow" that helps Hitler!

59,000,000 working days are lost in a normal year because of colds. This year, America just can't afford such a loss. The nation's workers *must* be strong—must keep up their resistance. *They are not strong enough now.*

National Research Council surveys[1] show that 71% of our industrial workers are living on inadequate diets... diets seriously lacking in essential vitamins and minerals. Leading scientists and nutritional authorities agree that this "hidden hunger" of vitamin-mineral deficiency is an important contributory cause of colds and general absentee illness.

## What Can Industry Do?

In these days of food shortages, dietary supplementation may be the one way to *make sure* your workers get all the vitamins and minerals they need to keep fit. Plants and offices that have given extra vitamins to their workers report fewer colds, less fatigue, improved efficiency and morale.

## Vimms... A Balanced Supplement

In recommending a dietary supplement many doctors prefer Vimms. Here's why:

**Vimms are complete.** They supply *all* the vitamins and minerals the Government recommends as essential. Further, Vimms supply these six vitamins in the full daily minimum amounts recommended by the Government.[2]

**Vimms are balanced.** Medical councils have established the proper ratios for compounding supplements.[3] Vimms are correctly balanced in these ratios.

**Vimms are tested.** Vimms potencies are chemically and biologically controlled. Thorough tests on human subjects prove that Vimms are completely assimilable, whether chewed or swallowed.

Vimms are palatable, low in cost. 50¢ for 24 tablets; $1.75 for 96 tablets; $5.00 for 288 tablets. But, most important of all, three Vimms a day will make up any difference between what your average worker gets in his regular meals, and the vitamin-mineral levels he should attain for top-notch working efficiency and vigorous health.

If you wish clinical samples of Vimms, please write Lever Brothers Co., Dept. IM-5, Pharmaceutical Div., Cambridge, Mass. (Offer good in U. S. A. only.)

[1] The Food and Nutrition of Industrial Workers in Wartime
[2] Food and Drug Administration
[3] Jour. of the A.M.A., July 18, 1942, pp. 948-9

**VIMMS MEET OR EXCEED MEDICAL RECOMMENDATIONS***

| Medical recommendations are based on these Gov't standards | VITAMIN | See how 3 Vimms meet or exceed these standards |
|---|---|---|
| 4,000 USP Units | A | 5,000 USP Units |
| 1.0 Milligram | $B_1$ | 1.0 Milligram |
| 2 Milligrams | $B_2$(G) | 2 Milligrams |
| 30 Milligrams | C | 30 Milligrams |
| 400 USP Units | D | 500 USP Units |
| 10 Milligrams | P-P (Niacin Amide) | 10 Milligrams |

In addition, Vimms supply these vital minerals:

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| CALCIUM | 375 Milligrams |
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*Jour. of the A. M. A., July 18, 1942, pp. 948-9

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LIME and mineral deposits make any sterilizer heat slower; best method of prevention is rinsing and draining the boiler each night and adding fresh water next morning.

Fill your Pelton Sterilizer to bottom of instrument tray with tray elevated; use until insufficient to cover load completely, before refilling. Distilled water is desirable for your instruments' sake. Always boil fresh tap water a few minutes alone before inserting instruments.

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because of a visual defect, to a more suitable job; (2) effected the transfer of a degreaser operator who showed evidence of sensitivity to trichlorethylene to a job safer to the worker; (3) arranged for the correction of hygiene practices and proper protection of two machine operators having moderately severe oil folliculitis, with the result that the trouble cleared up without the men having to lose time from work or be transferred to another job; (4) discovered an epileptic worker and arranged for his transfer from a job which was hazardous to himself and others, to one which was safer for all concerned. This nurse certainly had her eyes open. There are many such industrial nurses and they are making a real contribution to the war effort. Added alertness will be well repaid.

—*Safety Engineering*, January.

PITTSBURGH Section of the American Industrial Hygiene Association has the following officers for 1943: DR. C. E. BROWN, President; DR. FRANK HOLDEN, President-Elect and C. H. MEHAFFEY, Secretary-Treasurer. At the January meeting of the Pittsburgh Section, JOHN B. LITTLEFIELD, Industrial Hygienist, American Brake Shoe and Foundry Company, gave an interesting talk on "Control of Lead Hazards." In March the Section will meet jointly with the Western Pennsylvania Chapter of the American Society of Safety Engineers to hear DR. CHARLES F. KUTSCHER discuss "Occupational Eye Hazards." The April meeting will be addressed by JOHN F. MCMAHON, Managing Director, Industrial Hygiene Foundation, on "Absenteeism."

### Buffalo Committee

BUFFALO District Committee on Public Health and Education, of the Medical Society of the State of New York, consists of men and women in the medical profession, in management, and in labor who are already informed and who will map out a program for immediate action toward better industrial health. The committee will function as a public relations body, a fact-finding body, and one that will actively promote changes called for. An immediate objective is education of physicians, management and labor. Among physicians, the committee seeks to develop interest in industrial medicine, to rally volunteers willing to sacrifice some time on it, and to emphasize medicine's responsibility toward the industrial worker as a factor in winning the war. In educating management, the committee will make available factual material on benefits both in savings and increased output brought about through better industrial health procedures. These methods include environmental hygiene as well as physicians and nurses care. Regarding labor, the committee will try to develop in the trade unions an educational program dealing specifically with industrial health, including personal health and hygiene. It will attempt to encourage, within the unions, presentations on industrial health by specialists, separate and apart from organization and business problems. Started by this committee was a survey of all plants, including type of manufacture, number of employees (male and female), labor status, medical and nursing provisions, and eating facilities. These plants will be considered in order of their importance in the war effort, and a maximum health and safety program promoted among them. Meetings of the committee thus far have featured the problems of kerato-conjunctivitis, needs and inadequacies in plants with less than 500 employees, industrial nursing, absenteeism, nutrition, recreation, and publicity to reach the worker.

OKLAHOMA State Medical Association and the State Department of Public Health are cooperating in two institutes on wartime industrial health, one in Tulsa at the Mayo Hotel, March 18, and one in Oklahoma City at the Biltmore Hotel, March 19. DR. HENRY C. WEBER, Bartlesville, will open the program with a discussion on "Purposes and Objectives of the Program on Industrial Health of the Oklahoma State Medical Association." Members of the state department of public health will discuss "Technical As-

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with any solution commonly used for the disinfection of surgical instruments...

## 1 AN EFFICIENT GERMICIDE

| VEGETATIVE<br>Test interval (minutes) producing sterility | | | | | SPORE<br>Test interval (hours) producing sterility | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Test organism | PUS | | BLOOD | | Test organism | PUS | | BLOOD | |
| | wet | dry | wet | dry | | wet | dry | wet | dry |
| Staph. aureus | ½ | ½ | ½ | 2 | B. anthrasis | ¼ | ¼ | 1 | 1 |
| Strept. hemolyticus | ½ | ½ | ½ | * | Cl. tetani | 18 | 18 | 18 | 18 |
| Pseudomonas pyocyanea | ½ | ½ | ½ | 1 | Cl. welchii | 1 | 2 | 4 | 4 |

**Controls negative—did not resist drying*

## 2 CONSERVES THE BUDGETED DOLLAR

When used as directed, the Solution will not rust, corrode or otherwise damage steel instruments, glass or heat-treated rubber.

The Solution is non-injurious to the keen cutting edges of surgical knives and scissors, and delicate surgical instruments . . . thus serving to safeguard the surgeon's and hospital's instrument investment.

The Solution retains its high germicidal effectiveness over long periods of use if kept undiluted and free of foreign matter.

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**THIAZOINT**
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A valuable aid in controlling pyogenic infection in wounds and minor surgery. Useful as an adjunct to the usual surgical procedures in: Contaminated and Acutely Infected Superficial Wounds and Burns; Boils and Carbuncles; Varicose, Diabetic and Decubitus Ulcers.
*Supplied in 1-oz., 1-lb. and 5-lb. jars.*

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A greaseless cream which dries rapidly and forms an adherent, slightly astringent film. For the treatment of Impetigo and Other Superficial Skin Infections of Coccal Origin.
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Stimulates epithelization and promotes healing with minimum scar formation. Valuable in the treatment of Burns, Wounds, Abrasions and Varicose Diabetic and Decubitus Ulcers. An excellent means of applying U.S.P. Cod Liver Oil without its unpleasant features.
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HART NASAL JELLY
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sistance of the State Health Department Available to Industry." Among other subjects and speakers:

"Industrial Hygiene in War Production"—J. J. BLOOMFIELD, Bethesda, Maryland.
"General Relation of Medicine to Industry"—DR. CARL M. PETERSON, Chicago.
"Pre-employment Examination and Placement"—DR. CLARENCE D. SELBY, Detroit.
"Conservation of Industry's Manpower"—DR. WILLIAM A. SAWYER, Rochester, New York.
"Medical Legal Phase and Evaluation of Disability"—DR. JOHN ALBERT KEY, St. Louis.
"Management Looks at Industrial Health"—A. G. HEWITT, Chicago.
"Occupational Diseases and Their Control"—DR. LOUIS SCHWARTZ, Bethesda, Maryland.

HE SAID he did not mean that health and welfare were the whole answer—that most careful planning was required to change the psychological attitude leading to absenteeism—but that nothing could be overlooked. Health programs outside industrial plants were not as good as those inside; 85% of sickness had outside origin. "The industrial hygiene and safety programs of the country are entirely too diverse, however," he said, and suggested that the states take them up and coordinate them.

—CHARLES P. TAFT, quoted in *Providence (R.I.) Bulletin.*

PLANS for international cooperation to protect post-war workers from industrial accidents and health hazards are already under way in the International Labor Office.

—*Safety Engineering*, January, 1943.

## COMMENT and OPINION

EVERYONE knows it is difficult to get workers to wear respirators. The Division of Occupational Hygiene of the Massachusetts Department of Labor and Industries reports that one company pays the sprayer $0.03 extra per hour for wearing his respirator!

—*Industrial Hygiene*, February.

A RUBBER plant offers some health hazards. Workers apply the rubber cement to the seams and edges of the particular job they might be working on, by putting a wad of rubber cement around the index finger. Swelling and cracked fingers are the result.

—*N. Y. City Sunday Worker*, February 7.

IF EVERY person who lives within a mile and a half of his office would walk to and from work, there would be fewer absences because of sickness.

—DR. J. J. WITTMER, medical director, Consolidated Edison Company, addressing Industrial Hygiene Foundation; quoted in *Pennsylvania Med J.*

IT SEEMS sound to pay as much as we can as we go and to resolve that as soon as the emergency is over to devote our time and effort to the reduction of national expense—thus relieving our people of such high taxes that it virtually makes them economic slaves of a centralized and bureaucratic government.

—R. K. PACKARD, M.D., Chairman, Committee on Medical Economics, Illinois State Medical Society in *Illinois Med. J.*, February.

PROFESSORS ROBERT ELMAN and WARREN M. COX JR., and DRS. CARL LISHER and ARTHUR J. MUELLER, of the Washington University school of medicine, St. Louis, Missouri, set out to find what, if any, effect room temperature—depending upon climate, weather or air conditioning—might have upon the rate of healing in cases of burns such as are produced by incendiary and other bombs, gasoline fires, escaping steam and so on. Animals that had suffered severe burns were separated into four groups. Each group was placed in a different room, where temperatures were different. The coldest room had a temperature of 32°, the next warmer room, 55°; and the other two rooms, 75° and 99° F. All the animals in the two rooms of extreme cold and extreme warmth—32 and 99°, respectively—died within 24 hours. In the room with 55° temperature, the death rate was above 80%. But in the 75° room, only 26% died in 24 hours. Their recovery was greater than that of any other groups.

—G. B. LAL, in *Chicago Herald-American.*

REPORTING on observations made on more than 200 patients with epidemic kerato-conjunctivitis, the acute inflammatory disease of the eye which has spread from shipbuilding plants on the West Coast to the East Coast, MICHAEL J. HOGAN, M.D., and JOSEPH W. CRAWFORD, M.D., San Francisco, report in the current issue of *War Medicine* that: "The disease is most likely caused by a virus, the nature of which is unknown, but which may be related to the herpes facialis group. The condition is not highly infectious . . ."

—*Nebraska State M.J.*, February.

DO YOU know that women in industry, whose numbers are greatly increasing, absent themselves from work to a much greater degree than men—probably 60% higher? Do you know that 19% of these married women will have been pregnant during the year, and that about 12% of these pregnancies will have terminated in abortion?

—From "Wartime Problems of Industrial Health," by C. D. SELBY, M.D., in *Kentucky Med. J.*, February, 1943.

THE handicap of hernia in industry is apparent in the annual report on industrial accidents in Illinois, which shows that in 1941 there were 1,515 cases handled by the industrial boards. There was paid on these $211,441, and they necessitated 15,452 weeks of disability. Some further idea of the incidence of hernias can be had from figures furnished by the selective service examination boards. In 1917 and 1918, out of more than 2,000,000 men examined for the draft, 4% showed either hernias or enlarged

inguinal rings. Among the present draftees, 1.8% of the 1,000,000 men so far examined have been rejected because of the presence of hernias.

—From "Handicaps of Hernia in Industry," by RAYMOND W. MCNEALY, M.D., in *Wisconsin Med. J.*, February, 1943.

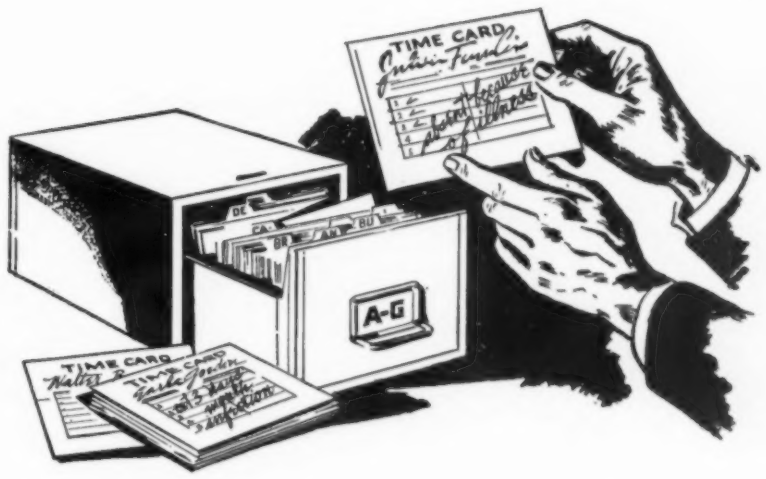
FOR years psychologists have been studying men, analyzing them, measuring their various traits and devising short-cuts to the estimation of specific abilities. For years, also, some employers have utilized contributions psychologists can make. Because of a sort of inertia, other employers have carried on with the old methods and have looked askance at aptitude tests and aptitude testers. Their attitude towards college professors was not helped at all by some of the things brought forth in Washington by professional dreamers. However, this matter of man and job analysis is no longer merely theoretical. There are records of successful application available.

—From "Job Aptitude," by ROBERT B. W. HUTT, in *Connecticut Industry*, February.

WAR INDUSTRY is being neglected. This may surprise you. Dr. Vonderlehr could have meant Pennsylvania when he said that not as many industrial employees are getting treated for venereal diseases as should. To get at syphilis in industry, the employees must be blood-tested, but the blood test should not be used to eliminate the working man. After the infected man in industry is found, his contacts must be traced and investigated. He should then be treated by a doctor of his own choice or, if this is not possible, in a good clinic. The clinic should be conveniently located, and evening sessions may need to be arranged so that all can be treated without loss of time from work. To do this job and to do it well is something that Pennsylvania doctors and clinics owe to the country.

—From a Letter by JOHN A. LEWIS, JR., M.D., P.A. Surgeon, U.S. P.H.S., Chief, Venereal Disease Division, Pennsylvania Department of Health, in *Pennsylvania Med. J.*, January, 1943.

DR. FRANK CONLIN, Omaha, has an article in February *Nebraska State M.J.*, on "Atypical Pneumonia of Unknown Etiology: So-called 'Virus Pneumonia,'" which he concludes as follows: "In this country at the present time there is an epidemic of pneumonitis of unknown etiology, with a typical chain of symptoms and definite findings. It is thought to be due to a virus, for it has all the characteristics of a virus disease; but up to the present time, the virus has not been isolated. The disease ordinarily runs a benign course, but there are a few severe cases, and deaths in a small group. Cross infection is an important factor, and some severe complications may occur, as the disease may take on virulence, and may be further complicated by secondary invaders. The treatment is symptomatic; sulfa drugs are of no avail."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Colds, a flu epidemic, trench mouth . . . where do they come from? How are they spread? More important still, how can they be prevented?

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FINELY divided metallic magnesium does not have the same effect upon the lungs that it exerts in the more dense subcutaneous tissues. The absence of "gaseous tumor" formation is explained by the free communication of the pulmonary air spaces with the external air. Even if manufacturing processes permitted inhalation of an appreciable amount of magnesium dust, it is highly improbable that serious injury of the lungs will ensue.

—Conclusion of "Action of Finely Divided Magnesium Upon the Lungs," by LEROY U. GARDNER, M. D., and A. B. DELAHANT, in *Am. J. Public Health*, February.

IT IS difficult to perceive any logical basis for a contention that accidental injuries should be compensated, but that a slowly progressing, insidious disease, caused by an industrial exposure over a long period of time, should not be compensated, or should be compensated on a lesser basis than should accidental injury.

—VOYTA WRABETZ, Chairman, Wisconsin Industrial Commission, in *Occupational Hazards.*

DAILY inspection of all hammers and chisels by the shop foreman is recommended by DR. FRANCIS D. GULLIVER in November *Archives of Ophthalmology.* In his experience with 1,800 intra-ocular foreign bodies, DR. GULLIVER has encountered only 10 which were not steel. Eighty per cent of the foreign bodies originated in the mushroomed edges of a cold chisel, a steel drill or a steel hammer. Excluding cases of irreparable initial damage, DR. GULLIVER found that in 80 to 90% of the cases in which the particle was successfully removed it was possible to retain normal or slightly less than normal vision after removal.

IN ORDER to prevent shortages of vitamins in the diet, as well as deficiencies of essential minerals and salts, the changes in our diet should be watched and the deficient vitamins replaced. The men in our armed forces have their diets so arranged as to prevent these deficiencies. They receive ample supplies of proteins, carbohydrates, fats, vitamins, and the other essential ingredients of a balanced diet; but who is going to look after a proper balance for the civilian population?

—*Medical Record.*

THE thinking minds of American medicine, observing the increase in the aging group, and realizing the proclivity of the old to die of diseases typical of their age, have devoted their efforts, if not to cure these diseases, at least to make them less devastating and to make their sufferance less oppressive. We have pointed out the need to alter the life and responsibility of the older workers, that they may still fit into our modern industrial economy, not alone with the altered physical stamina of old age, but with the diseases we know to be expected in those later years. Forced retirement on old age pension might more often be cruel than helpful . . . To the one mentally and physically able, forced retirement may well be the death warrant; if not physical, at least mental, with its stultifying condemnation of energy and pride in work. Granted that with advancing years in the skilled trades, as an example, comes a slowing of physical strength and muscular reaction and coordination, the mental processes may still be active and even more valuable to the trade because of the experience, the judgment, the pride in craftsmanship that are the rewards of later life. So has developed the specialty of geriatrics, as thinking minds of American medicine have pictured our changing population and its ills. If pediatrics was the wonder specialty of the past 30 years, will geriatrics develop to the point where the specialist in diseases of the aging will hang over his door: "Children under 65 not allowed here"?

—From "Not All Men Think Alike," by LEWIS T. BUCKMAN, M. D., in *J. Tennessee State M. A.*, February, 1943.

ANOTHER point which needs emphasis is that the eye hazards of industry are greater when workers are suffering from syphilis. The presence of this disease increases the severity of eye injuries; a little cut or bruise of the cornea, that would otherwise pass unnoticed, may develop into a serious condition if the worker has syphilis. This is not only

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sad from the standpoint of the individual, but serious in view of the need to maintain and to increase our industrial production to assure the earliest possible victory in the war.

—ELEANOR BROWN MERRILL, Executive Secretary, National Society for the Prevention of Blindness.

PERSONNEL directors are just becoming aware of the increasing average age of their employees. In certain industries this rise in average age has been at the rate of a year per year. The increase in relative numbers of older workers is certain to be accelerated by the present defense activity. Young men are taken into military training and there is an acute demand for trained, skilled and experienced artisans. Thus are arising many urgent and practical problems involving both clinical medicine and personnel management. Industrial medicine is in a particularly advantageous position to advance preventive geriatrics. *Through periodic health inventory and by education the industrial physician can reach more people over a longer time than any other clinician.* Much can be accomplished by the more conscientious application of existing geriatric knowledge while awaiting further research into the ageing processes. Major progress, however, will be postponed until such time that research into the fundamental questions determines what ageing is and does.

—From "Problems of the Aging," by E. V. COWDRY, published by Williams & Wilkins.

IF WE agree on the changing nature and extent of our common problems, I think we shall agree that we must prepare for the possibility of changing our methods of dealing with them. As the ratio of physicians to population becomes dangerously low in many areas, we must consider the possibility of industrial doctors' leaving their dispensaries for certain periods of community practice. If a skilled man is off the job in order to care for his sick wife, it is common sense (as well as enlightened humanitarianism) to treat the woman so that the man can return to war work, where every pair of hands is needed. It would seem that the day is coming when, in many areas, the community physician's practice and the plant physician's patients will have to be handled by one and the same man. That man should have—and must have—the cooperation of every governmental agency. He should have—and must have—the understanding and backing of his medical society. He must have the cooperation of the war-production-drive labor-management committees. He must have the same respect, encouragement and attention that top management already gives to operations departments. Last, and not least, he must have the friendship and understanding of the workers whom he treats, for only they, in the final analysis, can apply to their daily lives the precepts that he teaches. All of us, no matter in what field we work, have a single star to steer by. That is the belief that every man and every woman saved from illness or accident is a skill saved as well as a person saved. In the months ahead we shall need every skill, for it is only the total of our many skills on the home front and the battle front that will hasten the final victory.

—From "Government's Obligation in Industrial Health," by WARREN F. DRAPER, U.S. P.H.S., in *New England J. Med.*, February 11, 1943.

## Occupational Disease Coverage

OF THE laws of 25 states which provide for compensation of workers who contract diseases from their occupations, only 11 assure compensation for all such ailments, according to information from the Council of State Governments. In six of the 11 states—California, New York, North Dakota, Ohio, Washington and Wisconsin—the laws are compulsory, covering all employers, while in the five others—Connecticut, Illinois, Indiana, Massachusetts and Missouri—employers may elect to be covered. Limited coverage of occupational diseases occurs in the other 14 states whose laws list the ailments they recognize as compensable. West Virginia, for example, compensates only for silicosis, while Arkansas, Kentucky and Nebraska specify two or three diseases. Other states with laws covering up to 34 diseases are Delaware, Idaho, Maryland, Michigan, Minnesota, New Jersey, North Carolina, Pennsylvania, Rhode Island and Utah. Most of the occupational diseases laws are administered by the state agency taking care of workmen's compensation, and only half a dozen state

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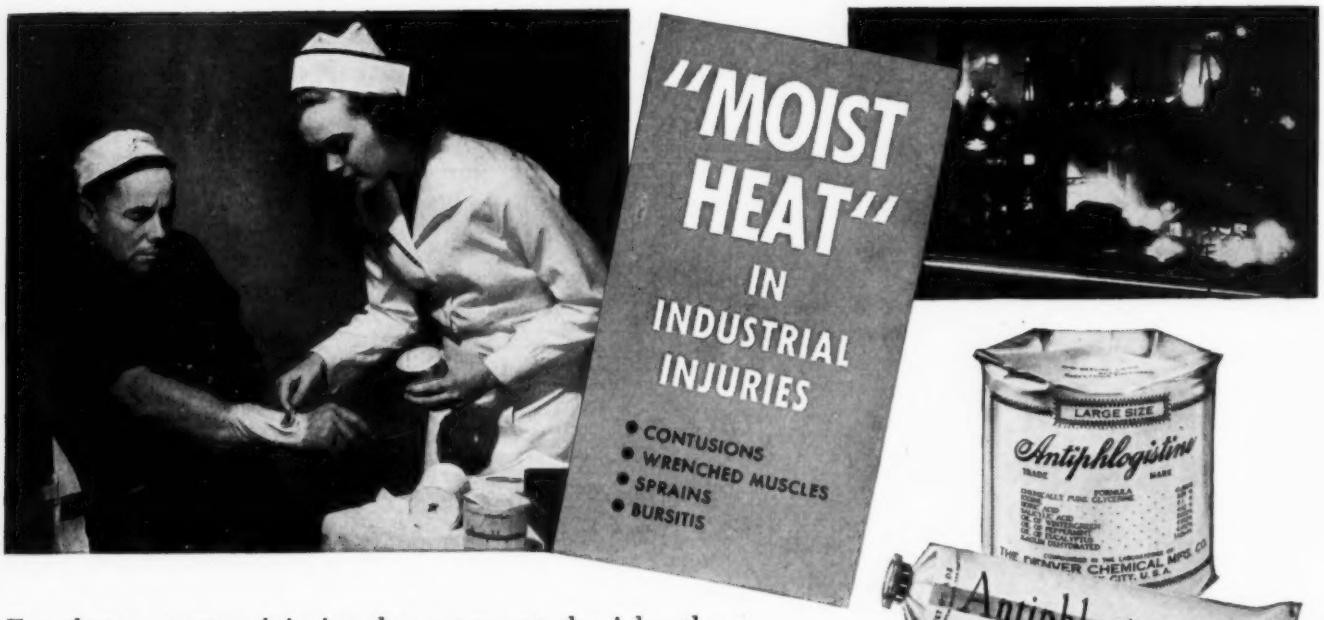


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laws provide for medical boards to decide on cases. In some of the other states the commission or the governor may appoint a board. Great variation, besides the terms of coverage, occurs in the laws. In 14 states claims must be filed within a year after disability or death from an occupational disease; in two states the claim must be filed within 60 days. Time limits on death compensable under occupational disease laws range from one year to an indefinite period. Medical care periods range from two weeks in Massachusetts to an unlimited time in seven other states. Under most laws disability payments are the same as for accidents and are deducted from death awards, though a few states—Arkansas, New York, North Dakota and Washington—make no deductions.

—*Keene (N.H.) Sentinel*, February 16.

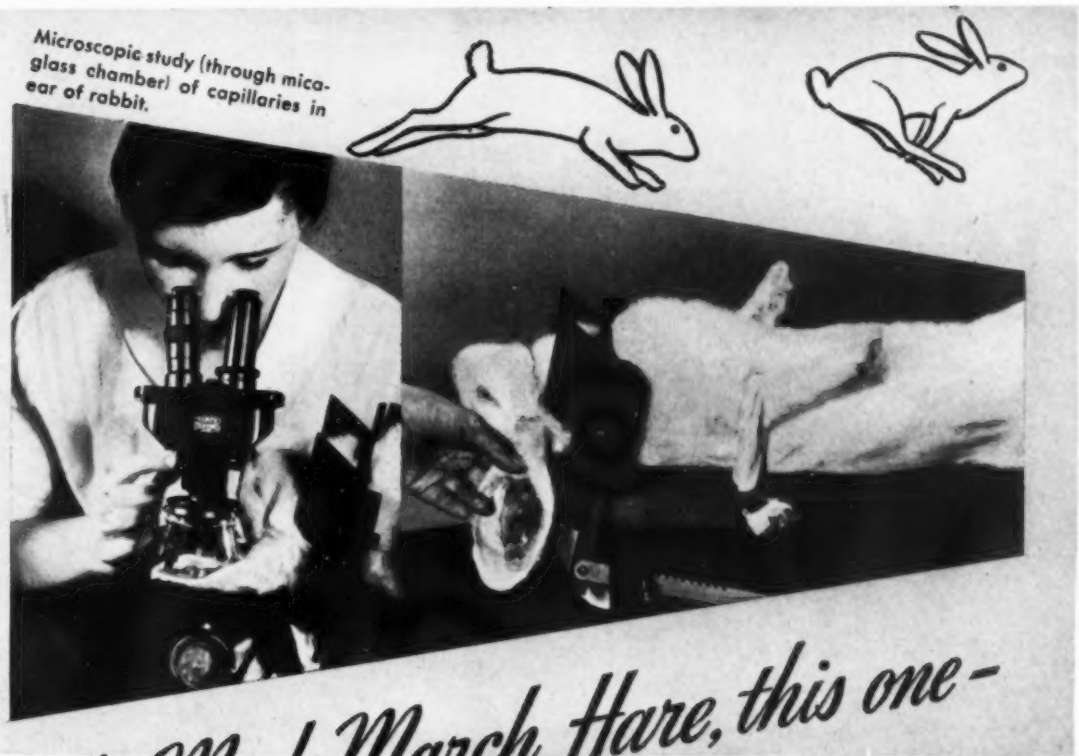
### Industrial Nursing Practices

THE Advisory Group of the Committee to Study the Duties of Nurses in Industry met on January 30 and 31, 1943, in Cleveland, Ohio. Data secured from the Survey of the Duties of Nurses in Industry were reviewed and recommendations made regarding desirable industrial nursing practices. The following topics were studied: (1) Standing orders. (2) Assistance with medical examinations. (3) Participation in health education program. (4) Assistance with safety education and accident prevention. (5) Assistance with plant sanitation. (6) Participation in welfare activities. (7) Records and reports. (8) Professional supervision of nurses in industry. (9) Special technical services. (10) Nonprofessional clinic assistants. (11) Home nursing service. (12) Duties outside the medical department. (13) American Red Cross home nursing and first aid classes. (14) Plant protection plans. (15) Qualifications. (16) Membership in professional organizations. (17) Salary. (18) Relation of medical department to other departments. (19) Number of nurses per unit of employees. (20) Distribution of nursing services. (21) Part-time nursing services for small industries. (22) Source of supply. A statement of the recommendations made and a report of the meeting will appear in all professional nursing journals in the near future.

—*Industrial Hygiene*, February.

### For Small Industries

IN NEW YORK City a group of small industries has been considering a plan to provide medical care for their workers on a cooperative basis. The plan was drawn at their request by Group Health Cooperative, Inc., a non-profit medical insurance organization. The problem in small plants has been one of dealing with unfamiliar industrial hazards, inexperience with industrial medical service, and lack of funds to supply needed medical service. A solution seems to be some outside agency with the necessary organization to provide a common service for a number of small plants in a given area on a cooperative basis. The plan drawn would supply in-plant services through full-time industrial physicians ( a ratio of one physician for each 2,000 employees) and nurses (one for each 500 employees). These in-plant services would include emergency treatment of accidents and illness while on the job, pre-employment and periodic physical examinations, medical check-ups on employees returning to work after absence, supervision of plant hygiene, and cooperation in safety programs and health education. The industrial physician would render only emergency treatment in compensation cases, and the patient would, under the New York State law, be free to choose his own physician for subsequent care. Closely correlated with these in-plant services is provision for home and office care and diagnostic specialist service for non-industrial conditions, which constitute the major causes of absenteeism. The out-of-plant service would be rendered by a panel of doctors open to any licensed physician in the community. The employee would have completely free choice of any physician on the panel. Because of objections raised by some employee groups to physical examinations conducted by industrial physicians, the plan provides alter-

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natively for pre-employment and periodic examinations to be rendered by the panel physician of the employee's choice. It is hoped that close cooperation can be obtained between the in-plant and outside services through the medium of the central organization. The family doctor and the industrial physician should not operate as two separate units, but as equal guardians of different phases of the employee's health. It is intended that this service should be financed by the employer at a basic premium per employee of $1.42 each month. For each *home* visit by the physician of his choice, the employee would incur a charge of $1.00 payable directly to the physician. In addition to this projected plan, Group Health Cooperative now has in operation a plan covering surgical, obstetrical and in-hospital medical care. This plan costs $9.60 a year for an individual or $24 for a family. The combination of these two plans would provide workers in war industries with comprehensive and integrated medical care at the plant, at home, and in the hospital.

—*Industrial Hygiene*, February.

## Nitrous Fume Poisoning

A CONFERENCE on nitrous fume poisoning held in Cincinnati, Ohio, January 28, 1943, was attended by about 35 people, including among others representatives of explosives manufacturing companies, the Office of the Chief of Ordnance, U. S. Army, the Office of the Surgeon-General, U. S. Army, the U. S. Bureau of Mines, and the U. S. Public Health Service. The literature on poisoning by nitrous fumes and case histories of recent fatal and non-fatal cases of poisoning were reviewed. Suggested engineering control measures were: (1) Ventilation; (2) adequate exits; (3) proper storage of materials likely to cause nitrous fume exposures. Several medical control measures were suggested: (1) Pre-employment examinations should include x-ray of the chest, excluding from employment individuals with certain upper respiratory conditions, asthma, reactivated tuberculosis, and diseases of the heart. (2) Any exposure should be reported promptly and the worker referred to the hospital for an evaluation of exposure. (3) Any workers showing evidence of burning of the throat or chest, epistaxis, lassitude, pallor, cyanosis, and abnormal breathing should have absolute bed rest for 24 hours as a minimal period of observation (distressing symptoms may show up as long as 72 hours after exposure). During the observation period the patient should be kept warm, supplied with oxygen if necessary, given a liquid diet, and have his blood pressure and pulse taken at regular intervals and recorded. The blood picture should also be studied periodically, particularly as regards red blood cell count, and hemoglobin and methemoglobin determination. If definite evidence is obtained that pulmonary edema is developing: (1) Bleed the patient 500-600 cc. (2) Use plasma to combat the hemo-concentration. (3) Administer oxygen continuously; administration under pressure may be advisable. (4) Do not give morphine. If sedation is necessary, allonal or luminal should be used. (5) Use of cardiac stimulants should be discouraged. (6) As this is an uncompensated alkalosis, soda is contra-indicated. (7) Give concentrated glucose intravenously. (8) Mercury diuretics may be tried. (9) Adrenal cortical hormones may be tried. (10) The most satisfactory treatment is prevention.

—*Industrial Hygiene*—Current News of Official Industrial Hygiene Activities, February, 1943.

## Vapor Control in Vermont

HAZARDS of systemic poisoning from cutting oils were reported in *Indiana Ind. Hyg. News Bull.* 1:9, September, 1941, and *Pub. Health Repts.*, 57:47, November 20, 1942. The Vermont Office of Industrial Hygiene reports the satisfactory solution of an oil vapor problem by the installation of an exhaust system with several interesting features. A plant manufacturing precision tools employed about 400 persons, with 48 engaged in the department under study. Before control was initiated, the conditions resulting from the operation of its thread grinding machines were of considerable concern to the company. There were material loss of oil, the safety hazard from oily surfaces, and the effect on employee morale of the heavy concentrations of oil vapor and smoke haze in the atmosphere. The

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department had 36 thread grinding machines in operation, of three different types. For one type, which was sufficiently compact, an enclosing exhaust hood was found most satisfactory. It was necessary to handle 780 c.f.m. which resulted in a face velocity of 200-300 f.p.m. at all critical openings. Although this hood enclosed a large portion of the top of the machine, access for adjustments and inspection was attained by having the sides of the hood hinged. The second type, with a comparatively large carriage, was controlled satisfactorily by attaching two exhaust connections to the machine. A negative pressure was created in the interior of the machine and when exhausting a total of 700 c.f.m. the face velocity at all critical openings was around 300 f.p.m., which was also sufficient to retain vapors given off at the grinding wheel. The third type of grinder has a relatively slow speed grinding wheel, and it was found that an 8-inch diameter flanged exhaust hood six inches above the wheel would control the vapors given off when exhausting 625 c.f.m. A steel mesh filter was placed in an inclined position in the duct directly above each hood to remove entrained oil droplets from the air stream; owing to the inclined position, the collected oil drained back to the machines by gravity. All sheet metal seams and joints in the system were soldered to prevent leakage of oil when the exhaust system was shut down. This measure has proved very worthwhile. The air cleaning unit, a Precipitron, with the cells arranged in a horizontal bank, removed the oil vapor and smoke sufficiently to permit 100% recirculation without noticeable re-contamination. With the fan handling a total of 23,000 c.f.m. the department was afforded a complete air turnover every 5½ minutes. Although no definite health hazard existed in this particular oil vapor problem, the individual features related to its control can be adapted to those of a more serious nature. For specific information regarding these installations, the reader may write to FRANK E. ADLEY, Industrial Hygiene Engineer, Industrial Hygiene Office, Vermont Department of Public Health, City Hospital, Barre, Vermont.

—*Industrial Hygiene*, February.

"WOMEN REPLACE MEN IN MANY VITAL JOBS."
"WORRIED OVER LACK OF MAN POWER."
"FARM LABOR SHORTAGE."
"WHAT THE LABOR BALANCE SHEET SHOWS."
"THEY CAN'T FIGHT THE WAR IN BED."
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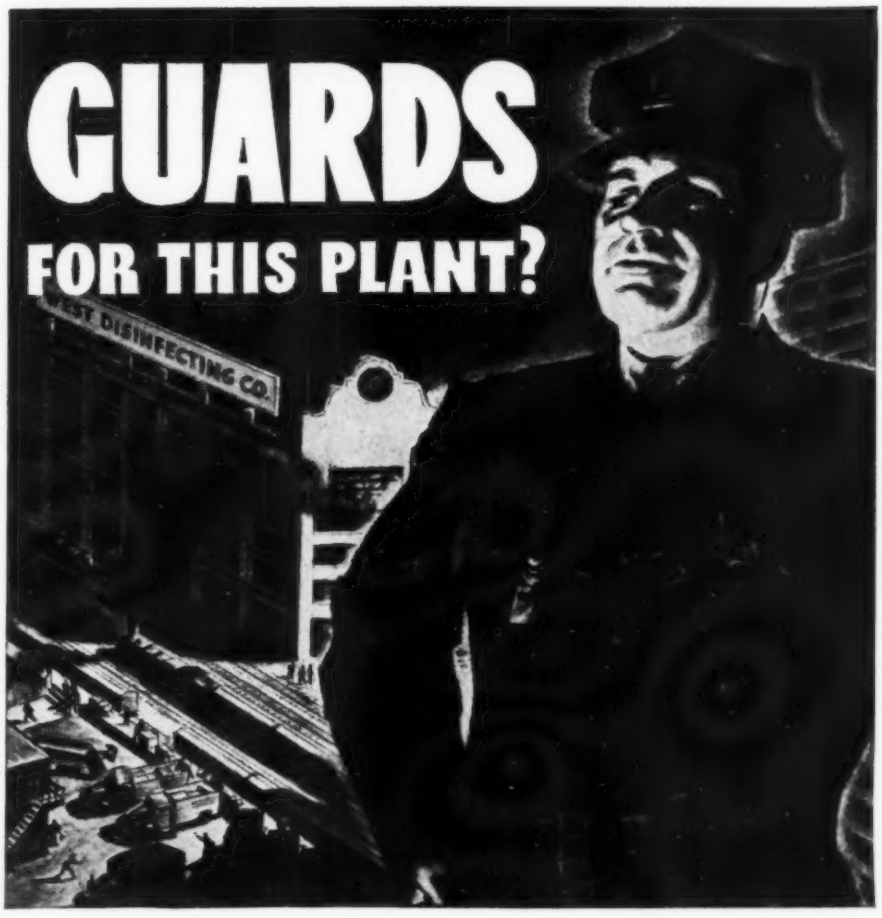
## Hernia

IN RECONSTRUCTING the architecture of the lower abdomen, one runs into innumerable difficulties. It is apparent that the abdominal wall resembles very closely in general architecture an automobile tire. Visualize, if you can, an old tire whose inner tube has deteriorated, whose fabric has lost its strength and whose rubber has lost its elasticity. Then you can appreciate what difficulties are encountered in repairing direct hernias. Direct hernias occur frequently in persons past middle life. Their tissues are, to say the least, not strong. Fascial planes are stretched and thinned, and muscles have become less efficient than they formerly were. To use this material and expect it to hold up under hard wear is not more reasonable than to expect good service from patched old tires. Much enthusiasm has been displayed in recent years for the use of autogenous grafts. The difficulties surrounding the removal and reintroduction of these grafts into new locations make any operation of this kind a difficult technical procedure. The introduction of old fascia into new locations cannot be expected to contribute a great deal. It is pleasant to record that the use of autogenous fascia in the repair of hernia was first described by the late Dr. McArthur, of Chicago. He described this method in 1901, and it lapsed into disuse only to be brought into increased popularity in the last few years.

—From "Handicaps of Hernia in Industry," by RAYMOND W. MCNEALY, M. D., in *Wisconsin Med. J.*, February.

## Lead, in Milk Canning

INDUSTRIAL Hygiene Unit, Wisconsin State Board of Health, has published a bulletin, "The Lead Hazard in the Milk Canning Industry." The study is based on surveys made in the can-making plants and the filling departments of five milk canning companies in Wisconsin. Atmospheric lead concentra-




# CERTAINLY... *It Helps Protect America's Essential Weapons!*

The men and women in our war plants are America's most essential weapons. They *must* be kept on the job. The U. S. Public Health Service estimates that 65% of all occupational diseases have been industrial dermatoses. Three *proven* products are recommended to help combat this threat and promote healthier and more productive hands.

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tions above the maximum permissible concentration of 1.5 mg. per 10 cubic meters of air were found in the general atmosphere of four can plants. Sources of lead contamination were the body seam soldering machines, the end-seam or floater machines, and the loading and remelt kettles. A lead hazard was not associated with the operations of casting solder pigs, or with the mechanical soldering operation of the filler machines. Recommended control measures include local exhaust ventilation, vacuum cleaning and process changes in the solder recovery operation.

### C'est la Guerre

FOR the duration of the war the *Journal* has been obliged to adopt changes that are not of its own choosing. Paper is becoming scarce and all publishers of periodicals who buy more than a certain tonnage each quarter have been limited by the War Production Board to 90% of the paper used in 1942. Furthermore, owing to the need for chlorine in the manufacture of munitions and other war materials, the good grades of paper pulp are unobtainable. In addition, the scarcity of manpower is a distinct handicap to the typesetter, the printer, the binder and the mailer . . . In the future, the readers of the *Journal* must be content with receiving, somewhat tardily, a periodical of smaller size and one that is printed on a poorer grade of paper. It is anticipated that the two weekly features, "Medical Progress" and the "Case Records of the Massachusetts General Hospital," can be continued, but original articles, like sugar and coffee, must be rationed. For all this, the *Journal* apologizes, but asks that its subscribers accept these unavoidable changes with the same spirit they have shown.

—From an Editorial in *New England J. Med.*, February 18.

### Dermatoses

AT THE request of General Aniline Works, the Dermatoses Investigation Section studied skin irritating properties of vinyl carbazole, a new di-electric. It was found to be a powerful sensitizer, and recommendations were made for its safe handling . . . Requests for testing the skin irritating properties of fabrics treated with anti-mildew, to be used by our armed forces, are increasing. The work is being done by DR. JOHN DUNN on volunteers at Walter Reed hospital and the Naval Medical Center. More volunteers are needed because of the large number of fabrics to be tested . . . At the request of Burroughs Wellcome, Tuckahoe, New York, an outbreak of dermatitis from emetine hydrochloride, being prepared for the use of our troops in the tropics, was investigated. Emetine hydrochloride is a sensitizer, and many handling it have been affected by dermatitis. Recommendations were made for its safe handling . . . The article, "A Practical Plan for the Treatment of Superficial Fungus Infections," by SAMUEL M. PECK, Surgeon (R), and LOUIS SCHWARTZ, Medical Director, was considered of such great interest to Latin American physicians in the Canal Zone that DR. JOHN R. MURDOCK, Chief Traveling Representative, Pan American Sanitary Bureau, requested permission to translate it into South American languages. The article appeared in their official Bulletin simultaneously with its publication in Public Health Reports, February 26 . . . The course on occupational dermatitis, given by DR. SCHWARTZ and DR. PECK under A.M.A. auspices in Chicago, was attended by 38 physicians.

—*Industrial Hygiene*, February.

### Chlor-acne

DR. LOUIS SCHWARTZ, after investigating, reports that the chlor-acne among electricians in Seattle shipyards which caused considerable alarm and a threatened strike, was due to the type of cable used and the fact that the electricians handled it continuously. Only one shipyard had cases of chlor-acne. The other three yards used a different type of cable and electricians spent only part of their time stripping. The alarm and threatened strike in the Seattle yards followed newspaper reports of a dermatitis outbreak and three deaths of acute yellow atrophy of the liver among workers at the Anaconda Copper Company, Hastings-on-the Hudson, New York. The Seattle electricians were using wire made by Anaconda and some of them had developed a dermatitis which they attributed to handling the wire. They were finally persuaded to remain at work until someone from the U. S. Public Health Service could arrive and make an investigation. DR. SCHWARTZ flew to Seattle, where he examined the workers who had the so-called "cable rash" to determine if it was a chlor-acne. The cable which caused the acne was found to

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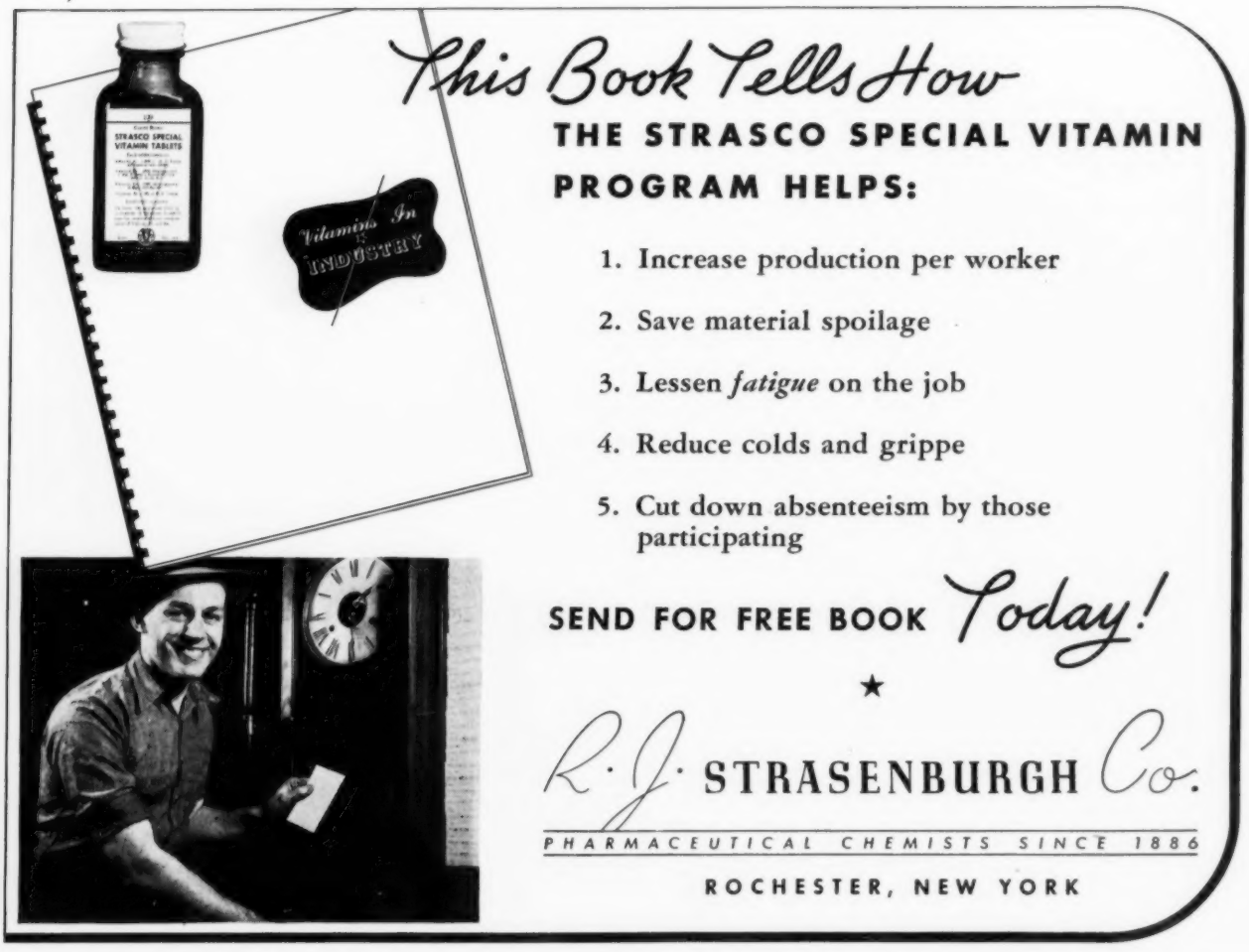


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be the Anaconda cable in which asbestos impregnated with chlorinated compounds is loosely packed and flakes off during stripping operations. Precautions recommended by DR. SCHWARTZ: (1) Workers engaged in stripping cable containing either chlorinated naphthalene, chlorinated diphenyl, or chlorinated diphenyl oxide should be supplied with hood respirators. It is preferably a transparent synthetic resin such as pliofilm or vinylite, or perhaps a fire-proof cellophane. The eye-piece should be a large flat plate of lucite rather than the conventional double lenses. The respirator should be closely fitted to the nose and contain such filters as will efficiently remove dust and wax. (2) Workers should be supplied with clean overalls daily, the overalls to be laundered at the plant. (3) Workers should wear long underwear and change them daily. (4) Workers should be required to take a shower before going home, and should be furnished with toilet soap for this purpose. If the hood respirator cannot be obtained or used, protective ointments of the type that coat the skin with a dry film and prevent the halowax from touching the skin should be applied to the face, neck, and ears. Two such ointments are the tetryl protective cream developed by the U. S. Public Health Service, obtainable from West Disinfecting Company, and a preparation called "Sav Skin No. 2." These ointments should be applied before going to work, washed off before going to lunch, reapplied after lunch, and washed off before going home. At the end of the investigation, a meeting of the dermatologists in Seattle was called and four cases of chloracne were presented before them to acquaint them with the diagnosis and the recommended treatment.

### Paper Utensils

THE Y PLANT, which once manufactured typewriters, today turns out sub-assemblies for machine guns. Located in a Connecticut river town, it used to employ 870 workers. Now, with the plant enlarged and operating on three-shifts, it has 2,600 men and women at work. For a time the Y Plant cafeteria, installed some years ago, tried as best it could to serve the wants of this enlarged staff of 2,600 workers. Extra cafeteria help was hired. Every effort was made, by staggering meal periods to serve the many new employees with well-balanced and well-cooked meals. But serving costs skyrocketed, and employees waited so long in line that they were forced to bolt their food, when at last they got it, in order to return to their machines on time. Plant morale declined noticeably. A routine Health Department inspection disclosed a bacteria count of 100,000 on a water tumbler—far above the safety level. It was clear that sterilizing equipment, pressed beyond capacity and manned by untrained labor, was not doing its job . . THE X PLANT makes tanks. It has 21,000 employees; 7,000 to a shift. It was built from the ground up on a cornfield. The nearest town is 14 miles away; 21,000 men and women must take some or all of their meals in the plant. It was necessary to build a restaurant. The restaurant had to be supplied with complete fittings, from steam tables to coffee urns—which inevitably meant a collision with priority rulings. The plant was beyond the jurisdiction of any city health officer because of its location. County and state officers were overworked. What about health precautions? Crockery plates, cups, and saucers would need to be washed and sterilized. And, under WPB Rule M-126, dishwashing and sterilizing equipment were under strict control. Also there was the additional problem of keeping trained restaurant workers on the job, with wage differentials constantly tempting them to trade a white apron for the overalls of the assembly line—a problem which some cafeteria and restaurant concessionaires have tried to solve by binding the plant by contract not to hire away their kitchen help . . . *BOTH the X Plant and the Y Plant*

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—"Eating Out in Wartime," Public Health Committee, Cup and Container Institute.

### Elusive Vitamin

CONSISTENCY is a virtue not to be expected, perhaps, of fish. At any rate, they are highly variable as to storage of vitamin A, according to species as well as distribution. In some, the liver is the main storage depot, only traces being deposited in other tissues, points out *American Journal of Pharmacy*. In others, such as halibut, the alimentary tract has as much or more than the liver, located principally in the mucosal coat of the intestine and pyloric caeca. The eel, peculiar unto itself, stores vitamin A in its flesh, as rich in this vitamin as rich butter. As pointed out (*Modern Medicine*) by U. S. Department of Agriculture scientists, vitamins in general are somewhat capricious. Vitamin C content in citrus fruit depends upon the time of harvest, position of fruit on the tree, location of tree in the orchard, and variety of fruit. Apple peeling has more than the apple itself, and the red side more than the green. Vitamin A in butter is equally variable, being dependent upon the breed of cattle, stall or pasture feeding and lapse of time after calving.

—*Hospital Topics & Buyer.*

### Counsellors

IN THE Aluminum Company of America plant women counsellors have been hired for each department. Their job is to make the women workers feel they have at least one patient, understanding friend nearby, a counsellor who may through her own mature experience be able to advise them on their headaches and heartaches. On a tour of Mid-Western war factories, we found that in all of them absenteeism among women workers was a serious problem. But it was much less a problem at the Alcoa plant than at plants which had no counsellors. Alcoa's women counsellors told us: "These women workers here are glad to come to work, not dashing in at the last minute but ahead of time." We saw them come to work as much as an hour ahead of time. Alcoa's production managers said the women are such good workers that they inspire the men to greater effort. Here's the way one of the women counsellor's explained she operates: "I make it my business to see every girl in my department every day, and there are about 125 of them. I know every girl and speak to her by name. It seems to mean a lot to them that I remember their names. When one of them has a funny story to tell I listen. When they have a sad one, and they have plenty of those, I listen and try to make them feel better with a kind word or suggestion. They feel that they can come to me and tell me their troubles. So many times they feel happier and much more willing to do a good job just by having someone to whom they can talk for a minute. I watch the tears roll down the cheeks of the woman whose husband is critically ill. I go over and talk to her a few minutes till she can get a grip on herself. Because these women know that my attitude toward them is that of a friend and well-wisher —that I am here to make them feel more at home—they even bring pictures of their family to show me, their sons or their husbands. Sometimes when they or their families get into financial jams I try to advise them, telling them what they can do under the law and what they can't do. There isn't anything special or secret about this. It's just being human with women who are doing a lot of hard work—and it is hard work, particularly for those who have a family. When a woman finishes here often she has to go home and work four or five hours around the house and maybe all day Sunday."

—JAMES MARLOW and GEORGE ZIELKE, in a Cleveland AP, February 26.

### Kerato-Conjunctivitis

MILWAUKEE'S epidemic of the infectious industrial eye disease, kerato-conjunctivitis, is on the wane after at least 429 workers in nine war plants have been victims. New cases are occurring, but they are milder. They also are dropping off in number. There probably have been more than the 429 cases, as it was found that 402 were in four plants. One plant has had slightly more than 200; another 112; one 60; another 14, another nine. Practically all were confined to shop workers—welders and machinists mostly. In only a few instances did the disease spread to office workers. Dr. Karl Habel (P.A. Surgeon, U.S. Public

# NOTHING IS TOO GOOD FOR THESE MEN . . .

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†JOHNSON, R. E.; DARLING, R. C.; FORBES, W. H.; BROUHA, L.; EGAÑA, E., and GRAYBIEL, A. (The Fatigue Laboratory, Harvard University and The Thorndike Memorial Laboratory, Boston City Hospital, Boston, Massachusetts): The Effects of a Diet Deficient in Part of the Vitamin B Complex Upon Men Doing Manual Labor, J. Nutrition 24: 585-596 (Dec. 10) 1942.

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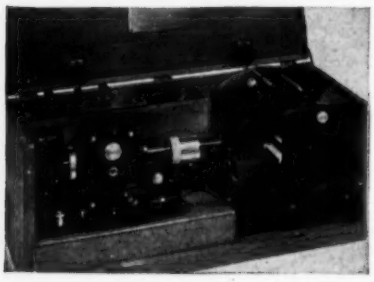

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Health Service) decided that the disease here was milder than in other cities. The ailment broke out in Oregon in 1941, apparently brought from Hawaii. It spread to the state of Washington, then to California, affecting shipyard workers mostly. A severe outbreak hit New York; and Detroit, Buffalo and Schenectady were the other cities that have had epidemics. A few cases have been unofficially reported in Superior, Wisconsin, and Duluth, Minnesota, shipyards. The disease apparently was brought to Milwaukee by migratory workers. It is believed that some persons now may be carriers. In all cases, however, the disease is spread by contact with a carrier or a victim or with articles that a victim has handled; such as towels, handkerchiefs or clothing. In a case here a husband contracted "kerotitis" at work, passed it on to his wife, and she to their child. Other cases have been found where relatives picked it up from other members of the family. Severe cases continue for three to eight weeks. Many of those in Milwaukee lasted one to three weeks; some only a few days. While there was an outbreak in the nation in 1930, there has been too little opportunity to follow cases through to determine whether there is any permanent impairment of vision. The disease is so new to America that hardly anything is known about its prevention or treatment. Victims live in mental fear of giving it to others. Early diagnosis has been strongly recommended. Isolation of patients when their outbreak becomes acute is urged. Strangely, the disease seems to appear suddenly and in several parts of a plant all at once. The difficulty in tracing the cause has been to find the first case. That has not as yet been done anywhere.

—*Milwaukee Journal*, February 4.

## Labor Hopeful

PAUL CHRISTOPHER, Knoxville, president of Tennessee State Industrial Union Council and State CIO director, said labor is "hopeful" of getting favorable action on the bill, which would amend the state code to include a section reading "Injury and personal injury shall mean injury by accident arising out of and in the course of employment, and shall include the following occupational diseases:

1. Poisoning by: arsenic, cadmium, carbon monoxide, cyanide, halogenated hydrocarbons, hydrogen sulphide, lead, mercury, methanol chloride, nitric acid, phosphorus, benzol or its homologues and derivatives, carbon bisulphide, chlorine, formaldehyde, hydrochloric acid, hydrofluoric acid, manganese, methanol (wood alcohol), nitrous fumes, petroleum or petroleum products, sulphuric acid, zinc, sulphuric dioxide.
2. Anthrax caused by handling wool, hairs, bristles, hides or skins.
3. Blisters caused by prolonged or repeated use of tools or mechanical appliances.
4. Synovitis, tenosynovitis or bursitis due to an occupation involving continual or repeated pressure on the parts affected.
5. Chrome ulceration.
6. Compressed air illness.
7. Dermatitis: inflammation of the skin due to oils, cutting compounds or lubricants, dust, liquids, fumes, gases or vapors.
8. Diseased condition caused by exposure to x-rays or radio-active substances.
9. Diseased condition of the eyes due to electric arc and welding, and cataract in glass workers.
10. Epitheliomatous cancer, or ulceration of the skin or of the corneal surface of the eye, caused by tar, pitch, bitumen, mineral oil or paraffin or any compound, product or residue of any of these substances.
11. Glanders caused by handling any equine animal or the carcass of any such animal.
12. Infectious or contagious disease contracted in the course of employment in or in immediate connection with a hospital or sanatorium in which persons suffering from such diseases are cared for or treated.
13. Miners' nystagmus, incurred in underground work.
14. Asbestosis. 15. Silicosis."

—*Knoxville News and Sentinel.*

## From Dr. Carlson

THE food problem facing us in this war is far more difficult and serious than that of 1917-'18. We have had years of "planned" restriction of food production, including the wasting of six million pigs. Two years ago the department of agriculture and the social security administration sponsored an educational nutrition campaign, based on the assumption that less than 25% of the American people eat an adequate amount of the essential foods, and that one-third of the American people suffer from distinct malnutrition. If this was even 10% true, what are

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For constipation accompanied by hyperacidity. Slightly more active than Petrogalar-Plain. Contains 6% milk of magnesia.

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For those who prefer unsweetened Petrogalar or for the patient with diabetic tendencies. Contains no sugar or assimilable carbohydrates.

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For use where fluid-extract cascara sagrada is indicated. Not bitter. Each tablespoonful contains the physiological equivalent of 2 cc. fluid-extract cascara sagrada U.S.P.

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we up against now in the matter of national nutrition with a global war on our hands calling for our greater physical and mental effort and endurance under increasing food restrictions, actual food scarcity, and possible decreased food production? How can we "eat more" of that which is not to be had even in the black market? From what I know of human nature, we can neither fight our hardest nor produce at our best with anxiety about tomorrow's meals disturbing both mind and gut.

—From a letter by PROFESSOR A. J. CARLSON, Physiology Department, University of Chicago, in "Voice of the People," *Chicago Tribune*, March 4, 1943.

## County Symposium

AT A SYMPOSIUM on industrial health and hygiene by Cambria County Medical Society at Johnstown, Pennsylvania, February 11, 1943, DR. FRANCIS T. CARNEY emphasized the need of physical examinations for those seeking employment; DR. JOSEPH P. REPLOGLE stressed that, while the worker-industrial health physician contacts should be complete, they should not be allowed to supplant or impair the important patient-physician relationship; DR. M. W. KUHLMAN pointed out the important role which can be filled by the industrial health physician in bringing about fuller cooperation between management and labor; DR. A. G. NEILL brought out the need of specialized training of the industrial health physician in actual working conditions; DR. RAY PARKER gave the results of a survey of physicians' opinions on the industrial health program, conducted by the Pennsylvania Medical Association, and cited the point that costs should be reduced so that the small industries can "compete" successfully with large corporations in the matter of worker's health; DR. ARTHUR ZOBEL made the contribution that absenteeism is not nearly so much a matter of worker's health as of his individual habits; DR. GEORGE HAY, chairman of the society's industrial health committee, cited the important change in attitude of workers toward the program of industrial health, which at first had been viewed with suspicion and regarded as a "weeding out" process; and DR. W. S. WHEELING, told of advocating the wet method of drilling coal in an effort to prevent lung diseases of miners, and how the Berwind-White Mining Company at great expense is trying out the new system.

—*Johnstown (Pennsylvania) Tribune*, February 12

LEADERS of the Indiana State Medical Association are displaying their customary initiative in promoting the interests of the armed services and civilian health. The latest enterprise includes a plan to train physicians for service in war industries and to safeguard health in war boom areas lacking adequate medical supervision. The state association has arranged a two-day health conference tomorrow and Friday at Indiana University School of Medicine. Nationally-known authorities will discuss the various problems presented by industrial operations which affect the health of workers and their families. Physicians, lawyers, personnel directors and labor representatives have been invited to attend the conference. The sessions were suggested by the advisory committee on industrial medicine of the procurement and assignment service and the A.M.A. Council on Health. Hoosier physicians are establishing a fine record in this war, comparable to the outstanding service rendered 25 years ago. They have volunteered in large number for the medical corps. Others have been commissioned and are awaiting call for active duty with the armed forces. The medical association of this state stands high in national circles, where a program known as the "Indiana plan" has received general indorsement. The Hoosier public has reason to be proud of its medical association members.

—*Indianapolis (Indiana) Star*, February 24, 1943.

MODERN INDUSTRY announces "the re-birth of the United Automobile Worker's Medical Research Institute in Detroit after a lapse of six years. Just getting under way, the UAW Institute aims a three-pronged attack on the health and safety problem by (1) examining union members who think they're exposed to hazardous conditions on the job; (2) surveying plant conditions through questionnaires to shop stewards and committeemen; (3) enlisting the aid of the Michigan State Board of Health and the U. S. Department of Labor in investigating and recommending corrections for hazardous plant conditions."

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# *and the Nutritional State*

Nutritionists are unanimous in their assertion that the health, strength, and efficiency of our workers are directly related to their nutritional state. Failure to satisfy nutritional requirements leads to a drop in stamina, in ability to resist fatigue, and in accuracy of work. During these times, when food availability is curtailed and the worker may find difficulty in obtaining all the foods needed for good nutrition, these facts assume added significance.

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Physicians are invited to send for individual servings of New Improved Ovaltine. The Wander Company, 360 N. Michigan Ave., Chicago, Ill.

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**Ovaltine**

**Three daily servings (1½ oz.) of New Improved Ovaltine provide:**

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| CARBOHYDRATE | 30.00 Gm. | 66.00 Gm. |
| FAT | 3.15 Gm. | 31.95 Gm. |
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| RIBOFLAVIN | 0.25 mg. | 1.28 mg. |

*Each serving made with 8 oz. milk; based on average reported values for milk.

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## ...enlist the experience of Aloe

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The years of experience of the nation's largest surgical equipment and supply house will prove a valuable aid to you — in making sure of correct equipment, eliminating omissions, assuring efficient operation.

Whether your plans call for a simple first aid room or a complete hospital, you will find your local Aloe representative happy to help you write specifications—and bid on your requirements.

Write "The Aloe Industrial Division" telling us what size installation you have in mind. You'll be thankful for the help we send.

*Industrial Division*

**A. S. ALOE COMPANY**

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BUREAU of Industrial Hygiene, Connecticut State Department of Health, reports for December, 1942, 101 occupational disease cases, of which 96 were from dermatitis (oils, soaps, sulfur dioxide, synthetic resins, dyes and inks, organic dust and alkali); two were pneumoconiosis (silicosis); two were chromium poisoning; and one was infection.

—*Industrial Hygiene Digest.*

IN A RECENT management poll published in *Fortune* magazine, only one-quarter of manufacturing executives considered "unauthorized time off" a serious cause of manpower shortage. More than one-third of them termed it "mild," and nearly one-third more regarded it as no problem at all.

SECRETARY of the Navy Frank Knox, at a House military affairs committee hearing, March 3, submitted a record of private shipyard absenteeism for last year. The yards in the Great Lakes region had the lowest record—4.6%. Rates of yards in other districts: Atlantic coast; 8.2%; Pacific coast, 9%; Gulf, 8.1%; inland districts 6.6%. He said that a survey of principal shipyards and plants producing for the navy showed absenteeism reaching a new high of 9.4% in January. He estimated 4% authorized and 5.4% unjustifiable.

## ABSENTEEISM

CHICAGO TRIBUNE, March 2, captions a group picture: "London says these are British war workers basking before sun lamps between shifts at a war factory, and that use of the lamps has cut absenteeism to 'its barest minimum.'"

THE health ministry reported today that Britons are losing 22,000,000 work weeks annually through illness. This, it said, is the equivalent of 24,000 tanks, 6,750 bombers and 6,750,000 rifles.

—News Item, February 26.

AMERICAN Management Association held a series of meetings at the Palmer House this week, and Thursday talks were to be given by three women and four men on "The Utilization of Women Workers." An announcement was made that day that the three women would not be able to be present. One of them was to discuss, of all things, "Absenteeism."

—*June Provine's* Column, *Chicago Sun.*

THE house rules committee approved for action on the floor, a bill by Rep. Lyndon Johnson (D., Tex.), administration supporter, requiring navy yards to report to draft boards every three months the names of all employees absent without cause. Johnson offered his measure with the assertion that "absenteeism sank 42 Liberty ships in December alone," explaining that "the man hours lost through absenteeism would have produced that many ships" . . . THE growing number of workmen absent from their jobs, especially after week-ends, has been assailed bitterly by naval officials reporting on the progress of the war program before congressional committees. Monday morning "hangovers" have been given as one of the chief causes, plus the fact that the workmen are making more money than ever before with some apparently seeing no reason for working as long as they have cash . . . REVEALING that the special subcommtitee report on absenteeism will be released before the end of the week, Vinson asserted flatly that there is no comparison in the amount of time lost through strikes and the losses through the absence of workmen from their jobs. In the same period the losses from strikes was only 167,000 he said.

—News Items.

CIO UNITED STEEL WORKERS, have adopted a four-point program to reduce absenteeism in war plants. The action was taken at a labor-management rally of 580 representatives of steel companies and the union, meeting to spur production of steel. The program: (1) Determine extent of absenteeism in individual plants. (2) Canvass the workers, find their reasons for absenteeism and their suggestions for its elimination. (3) Present and enforce a program to cut absenteeism to a

ANACIN
*for Minor Headaches*

**Time out or "slow-down" often leaves gaps in vital production lines. To speed relief from pain due to simple headache and aid return to top performance, use Anacin Tablets. Anacin is also effective for the temporary relief of pain due to minor muscle aches and pains due to colds. So that you may try Anacin we will send you a FREE box of 20 dispensing envelopes.**

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Cumulation of clinical experience in arthritis treatment reveals that a well-planned course of therapy is desirable in all cases.

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Even in high dosage, ERTRON is not incompatible with measures aimed at relief of pain or correction of exciting factors.

## ERTRONIZE THE ARTHRITIC PATIENT

The technic of *Ertronization* employed by various authors is practically identical. All agree that a dose of six capsules of ERTRON a day should be maintained throughout the entire course of treatment, if possible. This high dosage is attained by gradually building up from an initial dose of two or three capsules daily.

A file card containing dosage suggestions in detail is available to interested physicians.

# *and* ERTRONIZE

THE following articles, representing studies on hundreds of patients in hospitals, clinics and private practice, describe the results obtained with ERTRON therapy. These articles in reprint form, will be sent to you on request.


LIVINGSTON, S. K.: Vitamin D and Fever Therapy in Chronic Arthritis, Arch. Physical Therapy, X-Ray, Radium, Vol. XVII, pp. 704-706, November (1936).

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ERTRON *is promoted only through the medical profession.*

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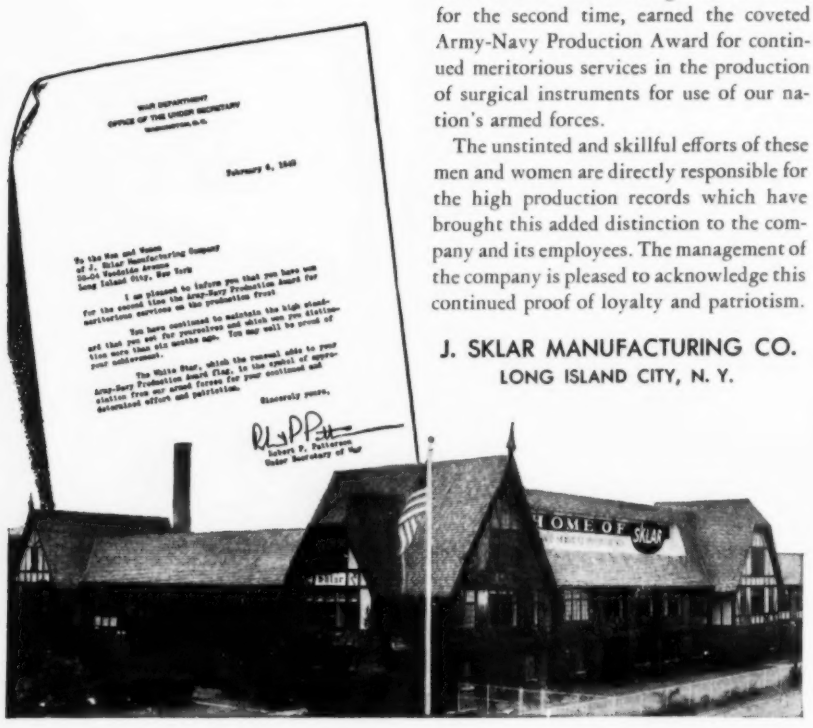
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OFFICE OF THE UNDER SECRETARY
Washington, D.C.
February 4, 1943
To the Men and Women
of J. Sklar Manufacturing Company
30-04 Vandeventer Avenue
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I am pleased to inform you that you have won
for the second time the Army-Navy Production Award for
meritorious services on the production front
You have continued to maintain the high stand-
ard that you set for yourselves and which won you distinc-
tion more than six months ago. You may well be proud of
your achievement.
The White Star, which the recessed side to your
Army-Navy Production Award flag, is the symbol of appre-
ciation from our armed forces for your continued and
determined effort and patriotism.
Sincerely yours,
Robert P. Patterson
Under Secretary of War
HOME OF SKLAR

The management of this company feels highly honored that the untiring, efficient and patriotic services of the men and women of the Sklar organization have, for the second time, earned the coveted Army-Navy Production Award for continued meritorious services in the production of surgical instruments for use of our nation's armed forces.

The unstinted and skillful efforts of these men and women are directly responsible for the high production records which have brought this added distinction to the company and its employees. The management of the company is pleased to acknowledge this continued proof of loyalty and patriotism.

**J. SKLAR MANUFACTURING CO.**
**LONG ISLAND CITY, N. Y.**

minimum. (4) Plan with management and union membership so that the effect of absenteeism on war production is held to a minimum.

—AP item, *Chicago Sun*, February 23.

FOR years the workmen have responded nobly to the pep talks and the pressure from higher up—the proof is in new records on output all over the country. But, as with dope, the effects are becoming more feeble. Our government and newspaper experts have always gloated that, in Nazi Germany, with its forced labor, there would come a saturation point and the workmen just could do no more, or even diminish in their productivity. Well, it seems to me that it can happen here. You won't see it in statistics, dollar output, or man-hour figures, but there it is. Ask the man in the shop, and I don't mean someone that got into industry by way of a six-weeks' intensive training course, but someone who has been in it for years."

—From a letter quoted by DAMON RUNYAN in his "The Brighter Side" column in Chicago *Herald-American*, February 2.

THERE is doubt regarding validity of interpretation that double time must be paid for seventh day not falling in the regularly scheduled workweek unless there is a mutually satisfactory agreement providing for one day of rest on the seventh. Already such a payment has been disallowed as a reimbursable cost item to a cost-plus-fixed-fee contractor. The solution seems to be an understanding with the employees that voluntary absenteeism shall operate to the same effect as a previously agreed upon day of rest. Otherwise, under some work schedules, an employee could take a day off each week and still receive double time, thus having the same advantage as an employee working steadily.

BELL AIRCRAFT corporation's "A.W.O.L." system to combat absenteeism has resulted in a reduction of 30% from peak absences the month before the plan became operative January 22, according to H. H. Munsey, chairman of Bell's labor management committee. "An even greater decrease has been accomplished in so far as unexplained or needless absences are concerned. There will always be sickness and other legitimate reasons for absence by a small percentage of our workers, but we are winning the fight to reduce the kind of absence which helps the axis." Bell labels as "A.W.O.L." those workers who fail to obtain permission for being absent. An "A.W.O.L." card replaces their usual time cards, and approval from the foreman or department head is necessary before the time card can be returned. Workers desiring time off must get permission at least one day in advance. Absentees must explain their absence, and those who are sick must bring a doctor's certificate when they return.

IN THE army it is called A. W. O. L. —absence without official leave. In the factory, personnel men loosely refer to it as absenteeism—employees absent from work without any reason connected with being sick or hurt. Its seriousness? The day after Christmas 26% of Boeing's employees in Seattle failed to show up. In other vital war plants over 50% stayed home. Worried over its 10% absentee rate, which stands for enough manhours to build 36 bombers a month, Consolidated Aircraft in San Diego last month set aside $10,000 in prize money for those workers with excellent attendance . . . Absence without cause is a wartime problem, brought about by too much work and too much pay, aggravated by the lack of skilled, dependable men and women to carry out the gigantic tasks which industry has undertaken. In peacetime voluntary absenteeism was a negligible factor in lost production, possibly only 2½% of total manhours. Then employees could not afford to miss a day's work. Chronic truants could be disciplined by suspension for a few days or by discharge. Today no disciplinary measure is effective because it is too easy to get another job. Employers who have no trouble getting and keeping workers need not fret over their absentee rate, except as it concerns occupational accidents or illnesses. But the majority, confronted with overwhelming orders on one hand and labor scarcity on the other, must use their available manpower as fully as possible.

—From "Idle Without Cause," by ELLSWORTH S. GRANT, in *Industry*.

ABSENTEEISM is a factor which can never be altogther abolished; but a somewhat more human industrial organization would doubtless reduce it. It consists of just plain

# IN SHARP CONTRAST...

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In the local treatment for deeper burns, and especially those about the hands, face and flexures, the several demonstrated advantages of Foille have been clinically noteworthy.

**The coating produced by Foille is found to be**

Soft and flexible
Virtually transparent
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(with saline solution)
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**The results under Foille management:**

Patients suffer less
Grafting permitted earlier
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Because of day-to-day performance in military, civilian and hospital practices, there is a steadily growing demand for

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Rx DESITIN OINTMENT

*The External Cod-Liver Oil Therapy*

**USED EFFECTIVELY IN THE TREATMENT OF**

**Wounds, Burns, Ulcers, especially of the Leg, Intertrigo, Eczema, Tropical Ulcer, also in the Care of Infants**

Desitin Ointment contains Cod-Liver Oil, Zinc Oxide, Petrolatum, Lanum and Talcum. The Cod-Liver Oil, subjected to a special treatment which produces *stabilization* of the Vitamins A and D and of the unsaturated fatty acids, forms the active constituent of the Desitin Preparations. The first among cod-liver oil products to possess unlimited keeping qualities, Desitin, in its various combinations, has rapidly gained prominence in all parts of the globe.

Desitin Ointment is absolutely non-irritant; it acts as an antiphlogistic, allays pain and itching; it stimulates granulation, favors epithelialisation and smooth cicatrisation. Under a Desitin dressing, necrotic tissue is quickly cast off; the dressing does not adhere to the wound and may therefore be changed without causing pain and without interfering with granulations already formed; it is not liquefied by the heat of the body nor in any way decomposed by wound secretions, urine, exudation or excrements.

**DESITIN POWDER**

*Indications:* Minor Burns, Exanthema, Dermatitis, Care of Infants, Care of the Feet, Massage and Sport purposes.

Desitin Powder is saturated with cod-liver oil and does not therefore deprive the skin of its natural fat as dusting powders commonly do. Desitin Powder contains Cod-Liver Oil, (with the maximum amounts of Vitamins and unsaturated fatty acids) Zinc Oxide and Talcum.

Professional literature and samples for Physicians' trial will be gladly sent upon request.

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staying at home. A questionnaire sent to 4,800 industrial workers in Germany disclosed . . . . that nearly 80% were not interested in, or indifferent to their jobs. Would America show a better ratio? One doubts it. The reaction of fundamental human nature to modern industrial methods is probably fairly uniform the world around. This active disinterest or indifference accounts for a large amount of deliberate idleness—even in the face of the wage loss which such absenteeism must entail. Figures are hard to find in this category. Florence estimates total absenteeism at about 5% of the working force, but this includes strikes, lockouts, and sickness. If one worker out of a hundred is always absent on the average because he dislikes his job, the total, in the United States would reach probably a quarter of a million on any given working day. One can only guess; there are no established facts which we have been able to find. But we know that square pegs in round holes account for a large total of wasted manpower.

—From "The Tragedy of Waste," by STUART CHASE, Grosset & Dunlap, 1929.

## Absenteeism Bureau

LAST month's comment about the interest of government departments in industrial absenteeism noted that this interest "has various unsatisfactory implications." One implication was, of course, that a new bureau activity of one kind or another would be evolved to deal with it. A current AP from Washington informs that on February 24 the house appropriations committee denied a series of requested appropriations, among them one of $337,000 asked by Secretary of Labor Perkins "for work in curbing absenteeism in war factories and improving conditions." Elimination of the request for $337,000 followed hearings at which Rep. Jed Johnson (D., Okla.) told the secretary that "a great many persons . . . . feel that you . . . are much more concerned about 'social gains' than in winning the war or stopping these strikes that are sabotaging the war program."

## Sickness

WHERE absenteeism is due to sickness the employee is interviewed by our works medical officer or the matron, who endeavor to find out more about the case and to give further treatment and advice to ensure complete recovery. We have recently gone a step further than this and are instituting a scheme whereby any person complaining of illness while at work is sent to the welfare department. If they are certified to be suffering from a cold, permission is given for them to leave the works and go home to bed for the rest of the day. This scheme was specifically drawn up to combat the common cold, as our medical officer believes that colds can be cured if caught within the first eight hours. The employee is doing a service to production by admitting his cold immediately, thus preventing it from spreading to his fellow-workers, also, by coming forward for treatment, he avoids the greater loss of time which would result if the cold developed. We also analyze absence due to sickness into several classes— catarrhal, digestive, functional neurosis, works accidents, home accidents and miscellaneous ailments. This does give a valuable cross section of illness and enables the medical section to take the necessary corrective measures. The problem of medical certificates is a very difficult one. Very often the panel doctor is at a disadvantage. He really does not know the working requirements of an employee, nor does he know the man or woman's outlook on their work, nor is he familiar with conditions in the factory. One of the ways in which this situation can be improved is to prepare a list of doctors on whose panels most of the employees appear and invite them, either all together or in groups, to meet the personnel manager and works medical officer. They can then be shown over the factory, learn something of the product and processes and the firm's employee services, thus enabling them to appreciate local conditions when certifying employees fit or unfit for work.

—From "Absenteeism," by R. C. N. CALLAHAN and C. A. MESLING, in *Labour Management*, December-January.

## Nutrition

EARLY in 1942, the National Research Council sent DR. ROBERT S. GOODHART, now Technical Adviser of the Nutrition Program and a member of the Public Health Service staff, on a nation-wide tour of industrial centers to study the nutrition situation. He found that lack

# INCREASED *Potency*

GREATER EFFECTIVENESS
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GREATER ECONOMY

More VITAMIN $B_1$ More VITAMIN $B_2$ More NIACINAMIDE

The patient for whom Betaplexin is prescribed now receives a substantially greater dosage of the various factors which comprise the vitamin B complex.

The potency of the declared factors in the various forms of Betaplexin is as follows:

| | ELIXIR | SYRUP | TABLETS OR CAPSULES |
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| | Each Teaspoonful (5 cc.) | Each Teaspoonful (5 cc.) | Each Tablet or Capsule |
| VITAMIN $B_1$ | 3 mg. (1000 U.S.P. units) | 3 mg. (1000 U.S.P. units) | 1.5 mg. (500 U.S.P. units) |
| VITAMIN $B_2$ | 1 mg. | 1 mg. | 0.5 mg. |
| VITAMIN $B_6$ | 0.3 mg. | 0.675 mg. | 0.1 mg. |
| NIACINAMIDE | 10 mg. | 10 mg. | 5 mg. |
| PANTOTHENIC ACID | 0.75 mg. | 1.8 mg. | 0.275 mg. |

All forms also contain other factors including biotin, choline, inositol and para-aminobenzoic acid.

HOW SUPPLIED

Betaplexin Elixir and Syrup: Bottles of 4 and 16 fluidounces and 1 gallon.
Betaplexin Tablets and Capsules: Bottles of 50 and 500.

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This cherished symbol of distinguished service to our Country waves from the Winthrop flagstaff.

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*Pharmaceuticals of merit for the physician*

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Gremlins
of sphygmomanometry
. . . OFF-LEVEL TILT
The accurate mercury manometer operates on the immutable law of gravity and should be so positioned that the mercury column, at rest, stands exactly at zero. Level placement of the instrument is essential to the taking of accurate bloodpressure readings. Regardless of the inherent accuracy of the apparatus, "tilting" will cause incorrect readings.
With the Lifetime Baumanometer, because of its wide bore mercury tube, any tilt is instantly detected and readily corrected. Moreover, due to its unique construction, a very appreciable tilt would be necessary to cause a consequential error. Every Baumanometer is individually calibrated and "leak proofed" to establish and maintain the mercury column at zero when placed upon a level surface... a factor designed to insure trouble-free bloodpressure service for the physician.
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of correct diet was causing workers to lag, take time off to rest, break down during important jobs because of nervous strain. Recommendations from doctors and nutritionists were the basis for a nutrition program; and ODHWS set up a regional organization to get it to workers and plant managers. Thousands of volunteers were recruited to serve on nutrition committees in communities in 2,700 counties in every state. These explained to war workers and homemakers why there was a real need for them to eat scientifically-measured meals, while representatives explained to industrialists the benefits of installing cafeterias in their plants and using competent nutritionists to plan strengthening, health-sustaining lunches and breakfasts. The recommendations included a "Victory Lunch"—citrus fruit or tomato juice, meat or alternate, raw vegetable salad, green or yellow vegetable, potato, and milk in some form. An Evansville, Indiana, plant reported absences were 19% lower in the first four months after installing "Victory Lunch Specials." Between-meal nourishment was recommended, to give added strength and to break monotony—these snacks to include tomato juice, fruit juice or milk, and enriched bread sandwiches with nutritive fillings. In a plant at East Pittsburgh, food-wagon service that supplies workers with between-meal energy has been credited with cutting the accident rate 30% in the face of a 21% increase in man-hours of work. Milk is another "must" on the recommendation list—a pint a day, if the worker is to get adequate supplies of calcium and B vitamins. A Trenton, New Jersey, war plant reported that a free half-pint of milk distributed daily to 1,500 employees during a five-minute recess accounted for a 30% reduction in accidents and general improvement in employees' health. Every Curtiss-Wright plant in the country provides food service for its employees. The Paterson, New Jersey, plant has seven cafeterias and 35 food wagons serving more than 250,000 meals a month. This cafeteria and food-wagon service is changing worker's eating habits. Introduction of Meat Conservation Day has developed use of meat alternates and unrestricted meats. Appetizing ways of serving fresh fruits and vegetables have increased their use. In one month, in the Paterson plant, 20,000 more pounds of fresh vegetables and 31,000 more pounds of fresh fruit were served than the total canned vegetables and fruit served in the same month. The national nutrition program has brought about the development of mobile cafeterias. These are specially-built trailers on standard automobile under-carriages, easily towed by an average-size car. Two men can handle the whole job of moving the unit in the plant and serving the food from two electrically-heated steam tables, four five-gallon thermos urns, and two soup containers. One of these "vitamin vans," as they are called in a Pittsburgh plant, feeds 1,000 persons in 30 minutes.

—From an OWI release.

## One Point

UNDERSECRETARY of War Patterson's labor advisers have a one-point program for ending absenteeism in war plants. Here is the one point: Communities should adjust themselves to the hours of the factories. Stores, banks, doctors, lawyers, plus other services should be available not merely for one shift of workers but for all shifts. At present, workers on the swing shift, beginning at midnight, find themselves out of gear with the life of the community. The greatest absenteeism is among workers on the odd shifts, and can be attributed not to indifference to winning the war but to the inconvenience of trying to live and buy food and get Johnny to the doctor, while the swing shift turns night into day. Absenteeism is higher among women than men, which may mean nothing more than trouble with the ration board. A woman will take a day off from the factory because she has to register for canned foods, or because a child is sick in the family, or because she hasn't had time to buy a new dress at the store. Remedy for this is nothing less than two or three shifts on the part of the services that serve the workers. The ration board, it is suggested, should come to the factory. In many cases, War Department advisers say, absenteeism is caused not by loafing, but by overwork. In certain machine-tool areas, such as New England, men have been working 50 and 56 hours a week for years.

—DREW PEARSON, *Chicago Herald-American*, March 3, 1943.

# Better Health for America's WAR WORKERS

***Today with longer working hours—with greater demands on physical and mental effort—it is of vital importance to conserve the health and energy and to increase the efficiency of your employees. Every facility should be provided to reduce absenteeism that slows down production.***

ARTIFICIAL sunshine is proving a vital factor in keeping employees fit and full of energy . . . *especially when overtime is necessary.* This is how England has solved one of her great labor problems—with artificial sunshine produced by Hanovia's wonderful Alpine Health Lamps.

***Absences caused by common colds have been reduced by over 40%.***

Dr. J. B. Sherman, medical supervisor at Cadbury Bros. works at Bournville, England made elaborate and careful tests on 1635 employees with various methods of preventing colds.

> While the average absence due to colds amounted to 106 days per 100 workers, in the group given periodic sun baths under Hanovia Ultra-violet Lamps, this record was lowered to 66 days per 100 employees.

Dr. Sherman concludes:

> "It was found that the only method of real value was ultra-violet irradiation, which reduced both the severity and the number of colds in patients so treated."

At the Harland Engineering Company's works at Alloa, sickness has been reduced among the office force by nearly 60 per cent and among the workers by over 35 per cent upon installation of a Hanovia Solarium.

Guy Motors, Ltd., of Wolverhampton, after 2 winters experience in providing ultra-violet sun baths to workers report:

> "Of those taking these sun baths only 3 per cent were absent through illness—of those *not* taking the sun baths sickness figures were 10 per cent."

An English writer sums up the value and importance of ultra-violet sun bathing as follows:

> "These lamps that radiate valuable ultra-violet rays to an extent even greater than the sun does in these latitudes—help workers to maintain energy, cheerfulness and resistance to infection.
>
> Hundreds of firms ranging from retail stores to the largest manufacturers have installed Solaria—specially equipped rooms—where this artificial sun bathing may take place—and let their employees attend them freely."

One of the most valuable advantages from the use of Hanovia Health Lamps is the reduction in absenteeism. These ultra-violet rays assure a general toning up of the body and bring about a reduction in fatigue. Thus the worker's productive ability is vastly enhanced and output is stepped up.

A Solarium may be designed on any scale. Its operation is so simple it becomes almost automatic. Even a small firm with less than 50 employees can easily fit a Hanovia Health Lamp in the first aid room with simple instructions to use.

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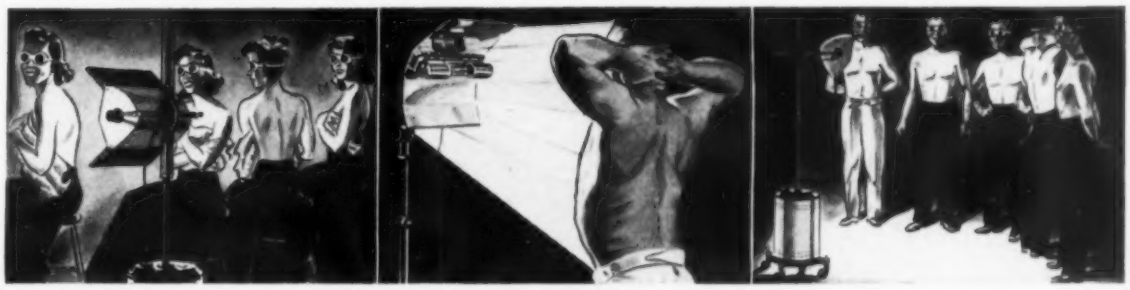
*World's larges tmanufacturers of Ultra-violet Health Lamps for the medical profession and home. Backed by almost 40 years of world-wide reputation.*



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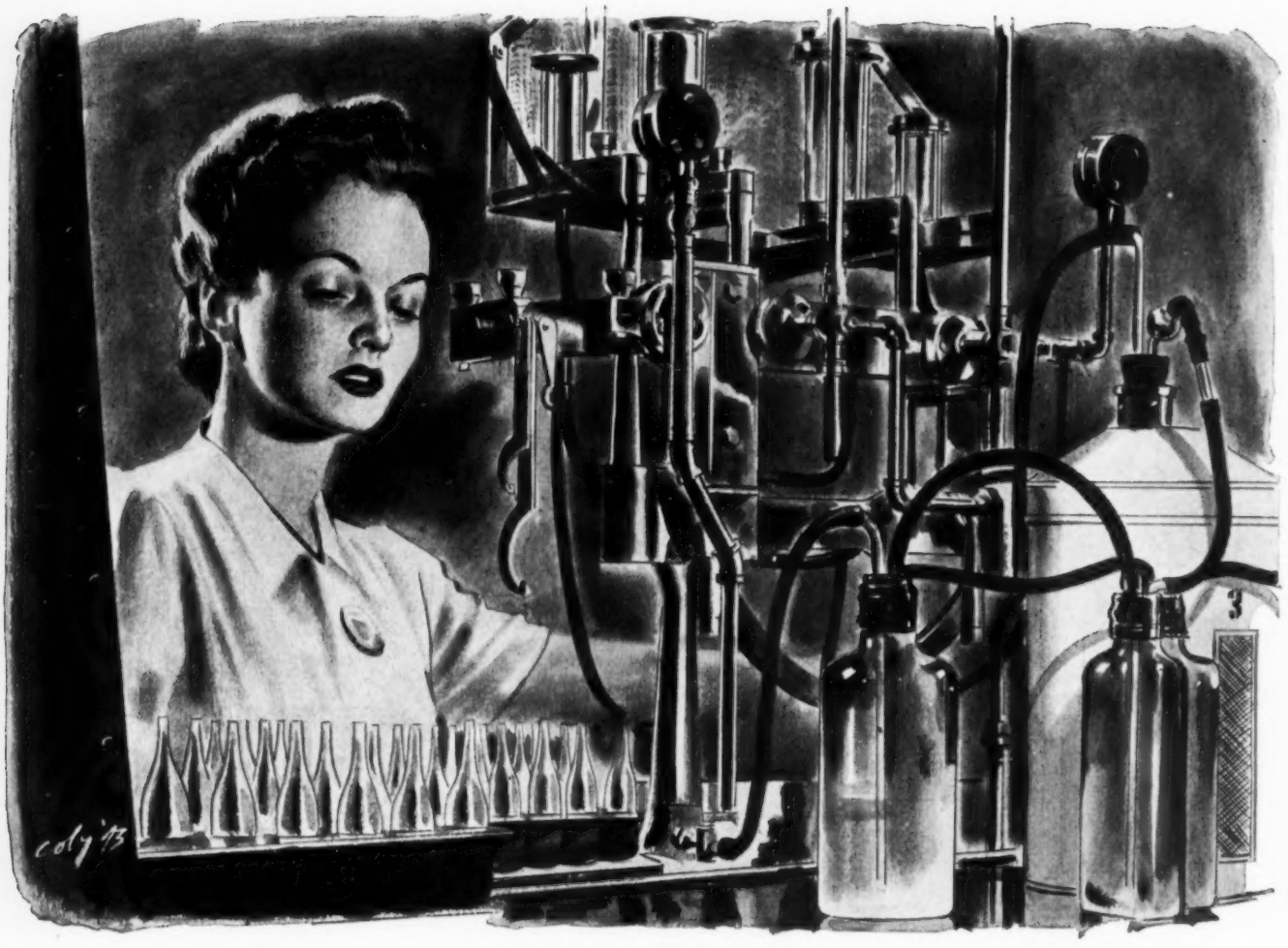

# Machines that Seldom Stop

DEMAND for medicinal supplies at the fighting front doesn't begin at eight o'clock and stop at five. In war there is no forty-hour week and casualties must be treated at all times—day and night.

Lilly employees feel deeply their obligation to produce a full share of essential therapeutic agents. Uppermost is the thought that machines must turn eight—sixteen—twenty-four hours a day to fill the needs of the allied armed forces.

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The Science, the Law and the Economics of Industrial Health

Volume 12 March, 1943 Number 3

# A Method for Handling Cases Gassed with Nitrous Fumes

*—Including the Diagnostic and Prognostic Value of Blood Platelet Counts in Assessing Pulmonary Irritation—*

A. J. FLEMING, M.D.,
*Haskell Laboratory of Industrial Toxicology, Wilmington, Delaware*

EXPOSURE to nitrous fumes (mixture of nitric oxide, nitrogen dioxide and nitrogen peroxide) is not uncommon in industry, particularly with the present great increase in the production of nitrated compounds for war explosives.

Pulmonary edema is one of the dangerous conditions that frequently follows gassing with nitrous fumes. Almost 200 years have elapsed since pulmonary edema was first described, and almost a century has elapsed since the first experimental studies of the condition were made.

During and following the first World War a considerable study was made of phosgene gas, which behaves like nitrous fumes in producing edema of the lungs.[1, 2] It is characteristic of these two gases that they can produce pulmonary irritation without causing pain or much discomfort. The treatment of pulmonary edema resulting from gassing is essentially the same whether the edema is caused by chlorine, phosgene or nitrous fumes.

While considerable information is available on nitrous fumes gassing and the lung pathology resulting from it, that information is not of much use to the industrial physician interested in preventing cases of pulmonary edema resulting from exposure to nitrous fumes, since there is little data available concerning what happens clinically between the time of exposure and the development of recognizable pulmonary edema.

When a worker has been, or is suspected of having been, gassed with nitrous fumes, there are three major questions that immediately confront the attending physician:

A. Has the worker received an exposure sufficient to cause pulmonary edema?

B. What symptoms, signs, or laboratory tests will give an indication of the severity of the gassing?

C. What can be done during the so-called "symptom-free" interval to prevent development of serious pulmonary edema?

Until we can answer these questions, we are at a loss to give a prognosis in a particular case and must simply rely on keeping the patient under observation for 24 to 48 hours, and in treating pulmonary edema if such develops. Naturally, this entails a serious loss of time, and anything we can do to shorten this period of observation without jeopardizing the patient will be of great value.

During the past few months, experiments have been carried out at the Haskell Laboratory in an attempt to obtain the answers to the above three questions. The method suggested below for handling pulmonary edema cases is based on both animal and human observations, as well as on the clinical data published after the first World War.

Dogs were used almost exclusively in our experimental work since they can be studied more completely from a physiological standpoint than smaller laboratory animals. A large chamber of 10 cubic meters capacity was used for exposures. Nitrous fumes were produced by the action of sulfuric acid on a known amount of sodium nitrite. The fumes were thoroughly mixed in the chamber by means of a fan. A dog was then placed in the chamber and exposed for two and a half to seven minutes, the usual time being five minutes. A sample of the gas mixture in the chamber was drawn off during the exposure period for determination of the actual concentration to which the animal was exposed.

The nitrite and nitrate fractions were trapped in three absorbers in series, each containing 20 cc. of 0.1 normal sodium hydroxide, all three being cooled in an ice bath. Efficient trapping was present as long as the sampling rate did not exceed 1 liter per minute. A sample of 2 to 5 liters was sufficient. The solutions from the three absorbers were combined and the total diluted to a known volume, usually 100 cc. Aliquots were taken from this solution for both the nitrite and nitrate determinations.

The concentration of nitrite (produced from nitrous acid and nitrogen trioxide) was determined by a modification of the Griess-Ilsovay reaction which is specific for the nitrite ion. The determination of the oxides of nitrogen present which gave nitrate depended on the production of a blue color when the nitrate-containing solution was treated with diphenylbenzidine reagent, then warmed and allowed to stand. Since nitrite interferes in this reaction, it was first decomposed by reaction with sulfanilic acid.

The concentrations of nitrous fumes hereafter men-

With the technical assistance of F. R. Blood, PH.D., W. R. Halpin, Rose C. McGee and Dorothy M. Bergen.

tioned express the combined nitrite and nitrate fractions in parts per million.

Our object being to find early signs that might serve as an index of the severity of exposure to nitrous fumes, observations on the blood pressure, pulse rate, respiratory rate and volume, blood morphology and concentration, the oxygen and carbon dioxide content of the venous and arterial blood and the carbon dioxide content of the alveolar air were made before and at regular intervals after exposure to known concentrations of nitrous fumes. Not all observations were necessarily made on each animal.

### General Observations

DOGS exposed for five minutes to concentrations of 100 p.p.m. or higher of nitrous fumes invariably developed some pulmonary edema, the duration and severity depending on the concentration of the fumes. Two dogs known to have abnormal circulations as a result of having been exposed to vinyl cyanide for several weeks developed pulmonary edema after having been exposed to 65 p.p.pm. nitrous fumes for three minutes.

Rats are apparently very sensitive to nitrous fumes, for exposure to concentrations as low as 13 p.p.m. for five minutes produced edema of the alveolar wall within two and a half hours after exposure and some exudate into the alveolar sacs within four hours after exposure. Rats exposed to concentrations of 67 p.p.m. for five minutes developed severe pulmonary edema within three hours after exposure, the trachea and large bronchi being completely filled with edema fluid.

During the first six hours after exposure, there was rarely any marked concentration of the blood. Since it has been repeatedly shown that hemoconcentration occurs in pulmonary edema in both humans and animals, the occurrence of hemoconcentration may be taken as a warning sign of the onset of severe pulmonary edema. The one significant early finding in the blood examination was in the platelet count. This finding will be discussed later.

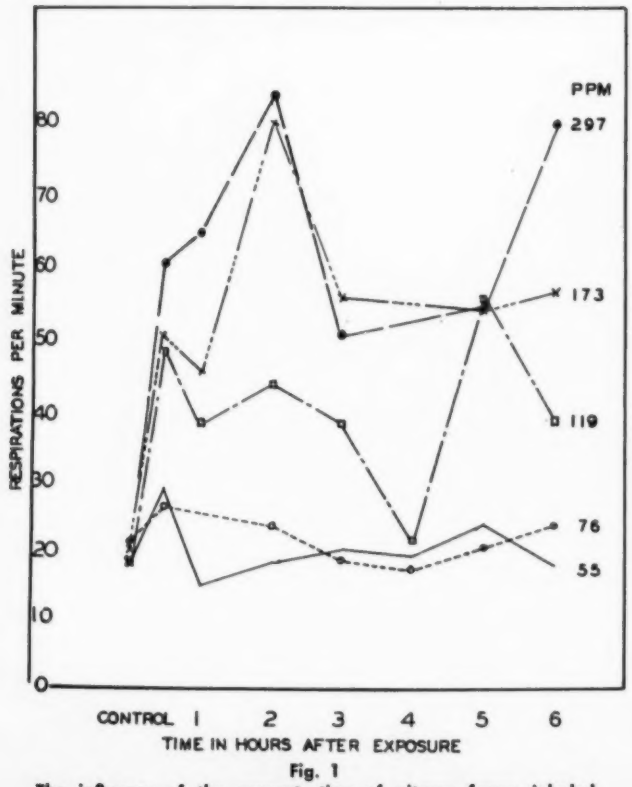


**Fig. 1**
**The influence of the concentration of nitrous fumes inhaled on the respiratory rate**

It was difficult if not impossible to detect rales in dogs even when fairly extensive pulmonary edema was present. This difficulty has also been noted in humans, and a failure to detect rales is by no means an assurance that edema is not present.

Vomiting was noted frequently in our dogs at the time of exposure or shortly after removal from the exposure chamber if the concentration was 100 p.p.m. or higher. This sign has frequently been observed in humans following exposure to dangerous concentrations of nitrous fumes.

The lung pathology observed in nitrous fume gassing is very similar to that resulting from phosgene poisoning. The latter has been completely described by Shaw Dunn[1] and no further description of the pathologic changes will be made except in so far as they have a direct bearing on the symptomatology.

### Changes in the Respiratory Rate and Volume

EXPOSURE to nitrous fumes in concentrations of 100 p.p.m. or higher for five minutes (all exposures are for five minutes unless otherwise noted) produced within two minutes a rise in respiratory rate that seemed out of all proportion to any possible immediate pulmonary damage. The higher the concentration, as a rule, the higher the initial increase in the respiratory rate, and the longer the rate remained elevated. In Fig. 1, the average increase in respiratory rate at intervals after gassing, in dogs exposed to various concentrations of nitrous fumes is plotted. The data for these curves are contained in Table I.

TABLE I.
AVERAGE INCREASE IN RESPIRATORY RATE OF DOGS FOLLOWING EXPOSURE TO NITROUS FUMES

| Concentration | | No. of Dogs | Time in hours after exposure | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | Control | ½ | 1 | 2 | 3 | 4 | 5 | 6 |
| Average | Range | Exposed | Respiratory Rate | | | | | | | |
| 55 p.p.m. | 25- 62 p.p.m. | 12 | 18 | 29 | 14 | 18 | 20 | 19 | 24 | 17 |
| 76 p.p.m. | 73- 80 p.p.m. | 4 | 21 | 27 | | 23 | 18 | 17 | 20 | 23 |
| 119 p.p.m. | 108-144 p.p.m. | 12 | 18 | 48 | 38 | 43 | 38 | 21 | 56 | 38 |
| 173 p.p.m. | 167-187 p.p.m. | 4 | 20 | 50 | 46 | 80 | 55 | | 53 | 56 |
| 297 p.p.m. | 252-330 p.p.m. | 8 | 18 | 59 | 64 | 84 | 50 | | 54 | 80 |

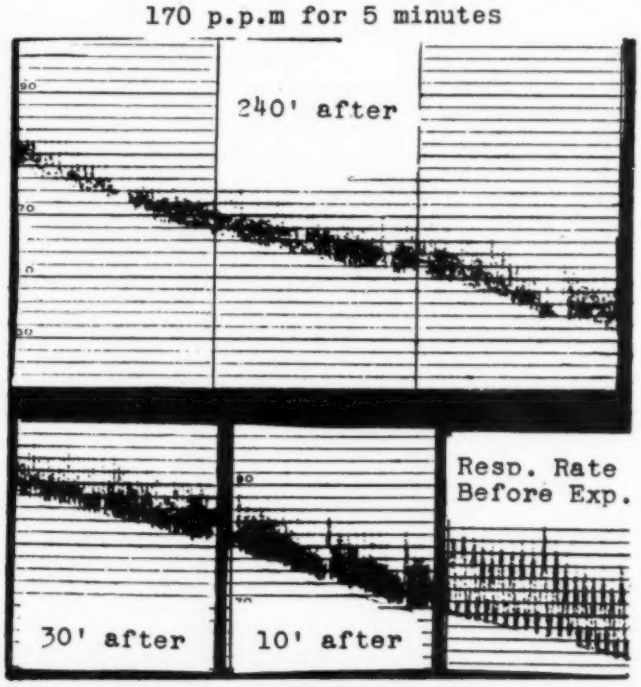


**Fig. 2**
**Respiratory tracing on a dog exposed to 170 p.p.m. nitrous fumes for five minutes showing changes in respiratory rate and volume**

The marked increase in the respiratory rate is not accompanied by an increase in pulmonary ventilation. Fig. 2 shows the effect on the respiratory rate and volume in a dog exposed to 170 p.p.m. for five minutes. The control rate was 20 and the average respiratory exchange 400 cc., giving a respiratory volume of 8 liters a minute. Ten minutes after exposure, the respiratory rate was 44 and the average respiratory exchange 200 cc., giving a respiratory volume of 8.8 liters per minute. Thus, in spite of a two-fold increase in respiratory rate, the ventilation of the lungs was increased less than a liter per minute.

There are probably two reasons for the marked increase in respiratory rate. First, spasm of the terminal bronchioles occurs, blocking off a large proportion of the effective lung tissue. Many of our dogs exhibited a distinctly asthmatic type of breathing during the first half hour after exposure. This has also been observed in human cases of nitrous fume gassing. Second, a marked increase in the sensitivity of the Hering-Breuer reflex probably takes place. These two factors are not so distinct as they may appear superficially since the primary stimulus of the Hering-Breuer reflex is the change of tension in the lung parenchyma. Any condition that increases the rigidity of the lung, such as bronchial spasm or thickening of the alveolar wall with edema fluid, will tend to produce rapid shallow breathing.

A study of the carbon dioxide content of the arterial blood as well as the carbon dioxide content of the alevolar air in two dogs before and after exposure to 76 p.p.m. and 255 p.p.m. respectively (see Table II) indicated that the $CO_2$ content of the blood and of the alveolar air is decreased. The sustained increase in respiratory rate is therefore not due to an accumulation of $CO_2$ in the blood acting on the respiratory center.

Fig. 3 shows the marked drop in alveolar carbon dioxide that occurred in another dog coincidental with the marked rise in respiratory rate. Sixty-five minutes after exposure, the respiratory rate had fallen considerably. The dog was then exercised by allowing it to walk around the room. The respiratory rate immediately rose to a level not previously reached, but the alveolar $CO_2$ continued to fall.

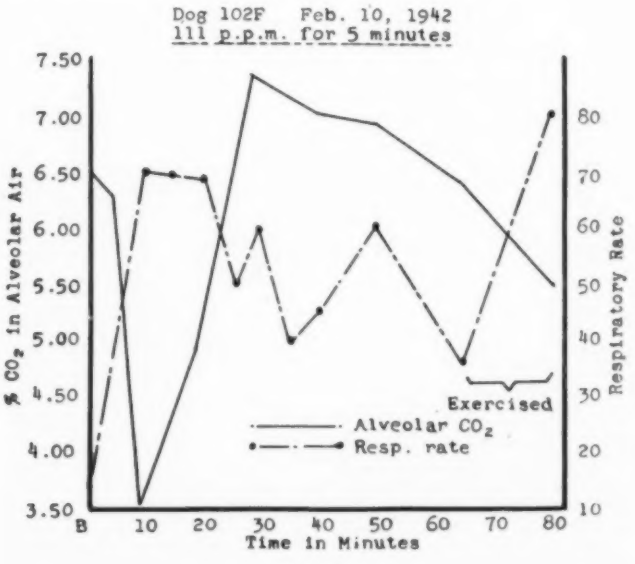


**Fig. 3**
**Changes in the respiratory rate and percentage carbon dioxide content of the alveolar air in a dog before and after exposure to 111 p.p.m. nitrous fumes for five minutes. (Exercise consisted of walking slowly around room or merely the effort required to maintain a standing posture.)**

With concentrations over 100 p.p.m., the oxygen content of the arterial blood was somewhat reduced and that of the venous blood was markedly reduced, as if the dogs were undergoing severe exercise.

### Changes in the Blood Platelet Count

INVARIABLY, we found that if the exposure to nitrous fumes was sufficient to cause pulmonary irritation, a marked increase in the venous blood platelet count occurred. This increase took place within a half hour after exposure. The extent of this rise and its duration depended as a rule on the concentration. Concentrations of 100 p.p.m. or higher produced a rise that lasted for several days. Concentrations below 50 p.p.m. produced, at first, a slight fall in the platelet count followed by a 10 to 15% rise two to three hours after exposure.

TABLE II.

FEBRUARY 16, 1942. DOG 102C EXPOSED TO 76 P.P.M. FOR FIVE MINUTES

| Time after end of exposure | % $CO_2$ Alveolar Air | Resp. Rate | Pulse | Arterial Blood $O_2$ Vol. % | Arterial Blood $CO_2$ Vol. % |
|---|---|---|---|---|---|
| Control | 6.09 | 14 | 54 | 24.73 | 51 |
| 5 min. | 5.82 | 20 | 68 | 23.95 | 49 |
| 50 min. | 5.63 | 20 | 60 | 23.95 | 51 |

FEBRUARY 18, 1942. DOG 102C EXPOSED TO 255 P.P.M. FOR FIVE MINUTES

| | | | | | |
|---|---|---|---|---|---|
| Control | 5.64 | 16 | 78 | 23.46 | 51 |
| 3 min. | 4.29 | 40-60 | 44 | 18.49 | 46 |
| 10 min. | 3.82 | 36 | 40 | | |
| 25 min. | 4.54 | 36 | 48 | 17.58* | 47 |
| 55 min. | 5.02 | 28 | 68 | 21.21 | 47 |
| 85 min. | 5.15 | 30 | 88 | 22.12 | 49 |
| 325 min. | 5.33 | 42 | 72 | 22.12 | 53 |

*Venous oxygen was 2 Vol. % at this time.

Fig. 4 shows the platelet response in three dogs exposed to various concentrations of nitrous fumes. This response is highly significant since Tocantins[2] has shown that the diurnal variations in blood platelets do not exceed ±6% and variations from day to day do not exceed ±11%.

Table III shows the platelet response in a human case of nitrous fume gassing that was recently brought to our notice. The patient had developed pulmonary edema before the first count was made and, therefore, the case is of no value in demonstrating the prognostic value of platelet counts. It is cited merely to

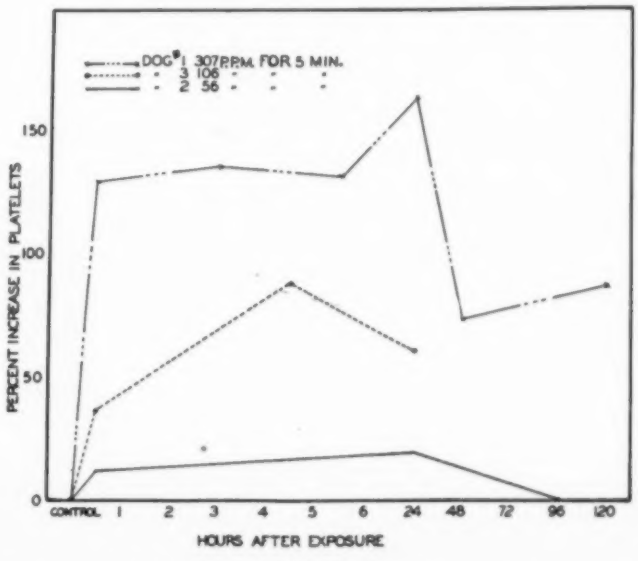


**Fig. 4**
**Extent and duration of the blood platelet increase after exposure to nitrous fumes**

show that a very high platelet count does occur in humans gassed with nitrous fumes. These counts were done on blood obtained from the skin vessels and probably vary considerably more than counts done on venous blood, owing to the fluctuations in the skin circulation. Since the upper limit of normal for platelet counts is 500,000 per cubic millimeter, the platelet counts on this man are abnormally high.

TABLE III.
SHOWING PLATELET RESPONSE IN A CASE OF NITROUS FUME GASSING

| Date | Time | Approx. Interval After Gassing | R.B.C. | Hgb. | Platelets |
|---|---|---|---|---|---|
| 11- 4-42 | 3:15 A.M. | 6 hrs. | 5.9 million | 110% | 510,840 |
| | 4:00 A.M. | 7 hrs. | 5.78 million | Not done | 583,000 |
| | 7:00 A.M. | 10 hrs. | 5.64 million | " | 2,763,000 |
| | 11:00 A.M. | 14 hrs. | 4.40 million | " | 734,000 |
| | 3:00 P.M. | 18 hrs. | 4.73 million | " | 1,002,000 |
| | 7:00 P.M. | 22 hrs. | 6.90 million | " | 680,000 |
| | 12 Midnight | 27 hrs. | 6.94 million | " | 499,680 |
| 11- 5-42 | 8:00 A.M. | 35 hrs. | 5.28 million | " | 733,600 |
| 11-18-42 | — | 16 days | — | " | 724,000 |

### Changes in the Circulation

BLOOD pressure changes were chiefly manifest in the first half hour after exposure as a fairly marked drop in systolic pressure and a moderate to slight drop in diastolic pressure. The drop in blood pressure occasionally persisted for two to three hours. The pulse rate varied surprisingly little. Usually there was a decrease in rate during the first hour followed by a return to normal. Even when extensive pulmonary edema was present, the pulse rate usually did not exceed the control rate. In human cases a marked fall in blood pressure has been noted, reaching values as low as 70 mm. systolic and 50 mm. diastolic at a time when edema is not extensive and cannot be detected by auscultation. Such circulatory collapse is one of the early indications of exposure to an injurious concentration of nitrous fumes and if not treated immediately can lead to severe pulmonary edema.

### Effect of Low Concentrations of Nitrous Fumes

TO TRACE the development of pulmonary edema during the first few hours after exposure, three groups of five rats were exposed to 13, 26 and 46 p.p.m. for five minutes. One rat from each group was killed at about hourly intervals up to the fifth hour after exposure. The lungs were subsequently sectioned so as to obtain a complete cross section. A uniform technique was used in cutting and staining these sections.

If it were possible to measure the width of a large number of alveolar walls in any section of the lung, we should be able to judge the progress of edema formation by the progressive increase in this width in lungs of rats killed at successive intervals after exposure. Such measurements would need to be made by the thousand to compensate for the various angles at which the alveolar tissue is sectioned—obviously a tedious job. To avoid this difficulty, we mounted a Weston photoelectric cell over one eyepiece of a binocular microscope and connected it through suitable resistances to a No. 3403HH Rubicon galvanometer. The intensity of the light source was kept constant so as to give a reading of 100 on the galvanometer when the light passed through the clear portion of the glass slide on which the lung section was mounted. Using the other eyepiece for focusing, 10 to 15 fields were selected at random along the pleural surface of the lung and the percentage of light absorbed by each field was then measured and the data averaged. The results of these measurements expressed in per cent light absorption

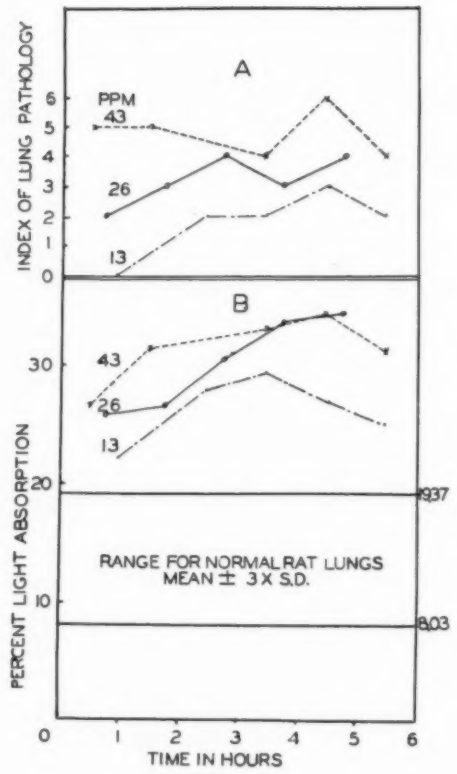


**Fig. 5**
**Microscopic (A) and photoelectric (B) measurement of pulmonary edema developing in rats following exposure to nitrous fumes. (See text for details.)**

are plotted in the lower (B) set of curves in Fig. 5 against the time in hours. Control rat lungs gave a mean percentage light absorption of 13.7 with a standard deviation of 1.89. The mean ±3 S.D. covered a range of 8.03 to 19.37% light absorption. As will be observed, the per cent light absorption in the lungs of rats exposed to concentrations of 13, 26 and 43 p.p.m. for five minutes is well above the normal range. The increase in the light absorption was due to thickening of the alveolar wall with edema as well as to edema fluid in the alveolar spaces. With concentrations of 43 p.p.m., extensive edema of the capillary wall was present even as early as one-half hour after exposure.

Quite independently, DR. D. M. GAY, our pathologist, examined the same slides microscopically and gave an index to the observed pathology based on the following five factors, listed in order of increasing severity:

(a) Congestion.
(b) Edema of alveolar wall.
(c) Exudate into alveolar sacs.
(d) Polymorphonuclear infiltration.
(e) Swelling and desquamation of the alevolar epithelium.

Each of these in turn he graded one or two plus, according to their severity. The maximum index of lung pathology possible was the number of factors possible multiplied by 2 = 10. The results of his observations are plotted in the upper set of curves (A) in Fig. 5. There is a great similarity between his measurements and those recorded photoelectrically.

These measurements show very clearly that even with low concentrations of nitrous fumes, swelling of the alveaolar wall in the lungs of rats takes place within half an hour after exposure. The higher the concentration, the more marked the swelling at any given time up to 4½ hours after exposure. The edema seemed to improve somewhat after the 4½-hour period with these concentrations of nitrous fumes.

**Summary**

THERE are two periods of anoxia following nitrous fume gassing. The first follows immediately after exposure and is due apparently to a spasm of the terminal bronchioles and an upset in the Hering-Breuer reflex, interfering with the aeration of the lung and causing acute circulatory collapse. The second period is associated with the development of severe pulmonary edema.

Blood platelet counts made on venous blood, if possible, are a very reliable index of the severity of gassing by lung irritants such as nitrous fumes. If a marked elevation in the count takes place immediately after exposure, it is a good indication that severe pulmonary edema will follow.

The changes noted in respiratory rate, blood pressure, the oxygen content of the arterial and venous blood, and the early lung pathology in nitrous fume poisoning are very similar to those already described in phosgene poisoning.

## Suggested Routine for Handling Nitrous Fume Cases

WITH the above observations in mind, it is possible to formulate a definite routine for observing and treating cases of nitrous fume poisoning, particularly during the so-called "symptom-free" interval between gassing and the onset of acute pulmonary edema. The routine suggested is contained in the answers to the three questions raised at the beginning of this paper, and is as follows:

**Question A:**

HAS the patient inhaled enough nitrous fumes to cause pulmonary edema?

Obtain a complete history of exposure by letting the patient describe his symptoms. Try to get the following information without asking leading questions:

1. How long the possible exposure lasted? How long ago did it occur? What activity has the patient carried on since the exposure (work, walking, eating, etc.), and did this activity cause distress?
2. Was there any coughing, choking, nausea, vomiting or headache at the time of, or shortly after, exposure?
3. Could he take a deep breath without discomfort?
4. Did an undue degree of lassitude come on after exposure?

A patient's statement, "I didn't feel a thing," may be misleading. A single cough is not usually regarded as a serious sign in clinical medicine, but it is an important sign following exposure to nitrous fumes.

An undue state of fatigue or lassitude is one of the most important early effects of exposure. This was observed repeatedly in mild cases of gassing during the first World War, and often the fatigue made men useless as fighters, and quite unable to take ordinary precautions for their own safety under fire.

This fatigue is apparently associated with the period of anoxia that occurs immediately after gassing. It is during this stage that absolute rest and oxygen are urgently required if we hope to prevent acute circulatory collapse or the development of serious edema.

Through ignorance or lack of supervision, gassed cases usually fail to report to the plant hospital at this stage as they should. In a case of phosgene gassing observed in April, 1941, the only positive signs or symptoms noted for several hours prior to the onset of pulmonary edema were cough at the time of exposure, consciousness of an inability to take a deep breath, and a very marked state of fatigue. Had these symptoms been brought immediately to the attention of the plant physician, the patient would never have been allowed to complete his shift, drive home from work and eat a fair-sized dinner. Eight hours after exposure, he showed severe circulatory collapse and pulmonary edema.

The patient whose platelet count is shown in Table III worked in an atmosphere he knew to be contaminated with fumes for three-quarters of an hour, at the end of which time he felt ill, had chilly sensations, pain in the chest, and vomited once or twice. In spite of this he remained at the change house for two hours before reporting to the plant hospital. Obviously, he had not been informed of the hazard of nitrous fumes.

In prevention and handling of these cases, it must be realized that workmen as well as physicians must be properly informed. Both plant supervision and the medical department are negligent if they do not warn all men who may be exposed to nitrous fumes of the hazard, and that the color of the fumes is no measure of the degree of hazard. Any nitration operation is potentially hazardous, and the details of the operation should be studied by plant supervision and the medical staff, with respect to the possibility of nitrous fume formation, either accidentally or in the normal course of operation.

If a positive answer is obtained to any of the above points in the history, the individual has probably been severely gassed. *He should be kept at absolute rest in a warm bed, and oxygen should be administered, while the following examinations are made, commencing as soon as possible after exposure and repeating every hour for the first eight hours:*

1. Observe and *record* the rate and type of respiration (deep, shallow, asthmatic) and examine the chest for rales.
2. Look for pallor or cyanosis.
3. Record blood pressure and pulse rate and score blood pressure according to the procedure outlined in the *Journal of the American Medical Association.*[4]
4. Make a red cell count, hemoglobin determination, direct platelet count* and hematocrit reading, every hour.

**Question B:**

WHAT signs, symptoms or laboratory tests will give an indication of the severity of gassing?

If the gassing has been severe, asthmatic breathing may be detected within the first half hour. The *respiratory rate* will be two to three times the normal rate. During the first six hours after exposure, it may drop somewhat, though still remaining far above the normal level, only to rise again if pulmonary edema becomes marked. The *blood pressure* is usually low in the first two to three hours but may become elevated if asphyxia develops.

A *platelet count* made on venous blood is highly significant. Even with exposure to low concentrations of nitrous fumes, the count may be 10 - 15% above normal. If it rises 50 - 100% above normal and continues to rise in the first five hours after exposure, the gassing has been moderate to severe.

The exact cause of this marked rise in platelet count is not known. Damage to the alveolar capillaries, with

*Made on venous blood, according to directions given in "Approved Laboratory Technique" by Kolmer and Boerner, 1st Ed., p. 95, 1931, (Appleton Century Company), using Rees and Ecker's diluting fluid. Note: In drawing the diluting fluid to near the 1 mark, leave a minute bubble at the tip of the pipette. A sharp demarcation between the blood and the fluid is obtained, allowing a more accurate measurement of the blood sample.

subsequent deposit of large numbers of platelets, many of which may be carried into the blood stream, may be responsible or the associated asphyxia may be, in part, responsible. Tocantins,[3] in a review on blood platelets, mentions a two- or three-fold increase in platelets following asphyxia with carbon monoxide or carbon dioxide. Whatever the cause of this marked rise, it is a very valuable index of the severity of gassing by nitrous fumes.

**Question C:**

WHAT can be done during the so-called "symptom-free" period.

If there is no history of coughing, respiratory distress, nausea, vomiting, headache, or marked lassitude, and there are found no significant changes in blood pressure score and volume index, respiratory rate and blood platelet count when observations are made every hour for eight hours after exposure, there seems little possibility of pulmonary edema developing, and the patient can be discharged.

If a positive history, or suggestive findings, are obtained, the treatment during this period and until the patient is out of danger should be as follows:

1. Reduce the oxygen demand of the body to a minimum: (a) By absolute rest. (b) By preserving body heat, and so preventing such oxygen consumption as would occur during shivering.

2. Give oxygen until the respiratory rate returns to normal, or until other signs indicate freedom from anoxia or pulmonary distress.

3. If pulmonary edema appears to be developing, give 1 cc. of 25% glucose-saline solution intravenously for each pound of body weight. The glucose will supply a source of food requiring a minimum of oxygen for assimilation, and the hypertonic solution will benefit the edema.

**Treatment if Edema Develops:**

CYANOSIS is the best indication of the presence of pulmonary edema.

2. OXYGEN, properly administered from a proper inhalator or by nasal catheter, is of the utmost importance. *It must be administered in concentration sufficient to keep the color of the patient pink.* (Experience gained in the treatment of these cases in the first World War shows that no case ever died from pulmonary edema when it was possible to keep the patient pink.)

3. VENESECTION will be of benefit if cyanosis and venous engorgement are present. *Venesection is not only useless, but actually harmful if the case becomes pale and goes into circulatory collapse (gray cyanosis).* By scoring the blood pressure readings, using the method described by Foulger and Fleming,[4] it is possible to detect impending circulatory collapse and decide on the advisability of venesection.

A useful index of circulatory balance may be obtained by using the ratio:

$$\frac{\text{Pulse pressure}}{\text{Diastolic pressure} + 1/3 \text{ pulse pressure}}$$

as an index of the filling volume of the heart (see nomograph in article referred to). In calculating the ratio, use the arithmetic average of the systolic pressure and diastolic pressure at the change of sound on the two arms. Ratios for the filling volume between 0.3 and 0.5 are normal. If the ratio is below 0.3, there is impending circulatory collapse when the pulse rate is 77 or lower. If the ratio is over 0.6, the chances are the patient will benefit greatly by venesection providing the systolic pressure is not below 100.

In Fig. 6, the blood pressure scores and the volume filling index of the heart for the patient whose platelet count is shown in Table III are plotted for 174 hours following gassing (A is the score calculated from the blood pressure readings taken at the annual examination five months before gassing). Scores over 0.20 are normal, below 0.20 and over 0.10 are doubtful, and 0.10 and below are abnormal. During the first 16 hours after exposure the score rose above 0.10 on only one occasion. This was shortly after 200 cc. of a 25% glucose-saline solution were given intravenously. Since this patient's pulse pressure was abnormally high (his volume filling index was persistently over 0.5) and his systolic pressure was continuously over 100, he would undoubtedly have benefited by venesection, which was not performed.

4. DO NOT USE: (a) Drugs acting on the respiratory center; e.g., morphine, barbiturates, etc.

(b) Cardiac stimulants or drugs supposed to increase blood pressure; e.g., coramine, adrenalin, etc.

(c) Sulfa-drugs, until it is certain that the patient is free from signs of circulatory collapse or anoxia, and then only if pneumonia complicates the picture.

It is important to remember that these patients are suffering from a lack of oxygen, and if this deficiency is supplied, circulation will be maintained and the patient will be quite able to cope with this condition without any other medication. Drugs which act upon the respiratory center or interfere with oxygenation of tissues will hinder rather than help the patient's recovery.

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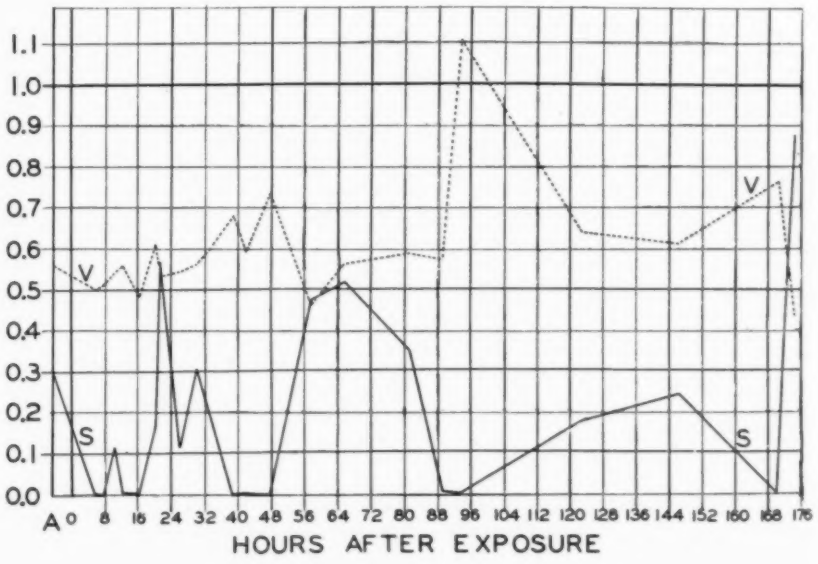


**Fig. 6**
**Blood pressure scores (S) and volume filling index of the heart (V) in a human case of nitrous fume poisoning. (See text for details.)**

## Carbon Tetrachloride

AT THE November 10, afternoon session of the Post-Graduate Course in Industrial Medicine, Long Island College of Medicine, DR. JAMES H. STERNER, Eastman Kodak, lectured on "Industrial Toxicology—Determining Margins of Safety." The discussion period after the lecture, DR. G. H. GEHRMANN, Du Pont, presiding, developed the following:

DR. E. F. RUSSELL: In regard to the use of carbon tetrachoride, are women more susceptible than men?

DR. STEINER: That is a good question to bring up at this time, and one that has been bandied around a great deal. These things "get in the light"; one fellow comes out in 1898 and says that women are susceptible, and it is passed along in articles from that time on. It is generally assumed that women are more susceptible, and, since the physiologic demands on the female are greater, there might be difficulties, such as menstruation, pregnancy, etc. But other than that, on a basis of equal health, I don't believe they are much more susceptible than men.

DR. RUSSELL: Well, there are three observations I have made: First, that the women *are* more susceptible; second, that they are affected very easily while smoking tobacco with their exposure to carbon tetrachloride; and third, that they menstruate very frequently—at least every two or three weeks. They will get a slight symptom, smoke a cigarette, and the symptom will be very much exaggerated. A day like today the carbon tetrachloride cases will increase, whereas on the clear days there is no appreciable effect with the exposure to carbon tetrachloride.

DR. GEHRMANN: May I ask you if they smoke in the atmosphere of carbon tetrachloride?

DR. RUSSELL: No. They go out to the ladies room, smoke a cigarette and then become violently ill.

DR. STERNER: It has been my experience that women are a little more critical to these exposures than men. Men will take a lot more before they will complain about it. We have a number of exposures to carbon tetrachloride, but, for the women, we keep our exposures down to 50 parts per million. Occasionally, however, we find some who just can't stand the odor of a solvent, and we have to transfer them.

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## Tuberculosis Case Finding in Industry

*—Through Mass Survey—*

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HISTORY reveals that a rise in tuberculosis mortality is a concomitant of war. During and after World War I there was an enormous increase in the incidence of tuberculosis in Europe, and in England such an increase has already been noted during this war. In a study of tuberculosis mortality rates in 46 of our large cities, Dr. G. J. Drolet, Assistant Director of the New York Tuberculosis and Health Association, found a rise in 19 of them in the first nine months of 1941. This upward trend in metropolitan areas is attributed to the changed conditions because of war industries. There is every reason to expect a still further increase unless all agencies, official and voluntary, use every available resource to combat it.

It is fully realized that it is essential for our future to win this war, and the finding of a case of tuberculosis, with the prevention of its further spread, is as definite an act toward winning the war as the destruction of an enemy plane or tank. This is especially true in the case of our industrially employed. A case of tuberculosis in a worker not only removes an important element in production but also necessitates the dissipation of the energies of many others to restore him to health. These people can and should be engaged in the more fruitful work of winning this war. The physicians, nurses, social workers, educators, attendants, dietitians, and all others directly or indirectly related to the care of a tuberculosis case will find that they have only a minimal amount of time to care for tuberculosis; and although by case finding their load will be greater, the removal of an open case from industry will in the long run prevent the increased rise in tuberculosis morbidity and mortality which we greatly fear. The industrial case, therefore, is more important than just any other case of tuberculosis.

The rise of tuberculosis mortality during war time can be attributed to many things. In Europe in World War I the problem of starvation and malnutrition was added to all the other factors. Here in the United States, while hunger in terms of caloric intake is not an important element, the hidden hunger of inadequate vitamin intake because of badly chosen foods is important. Fortunately, a vast nutrition program has been established and is making rapid strides toward solving this problem of malnutrition in the midst of plenty. However, many of the other factors which contribute to an increased mortality are operating here. The massing of our armed forces and the intermingling of industrial populations coming from all parts of the United States create a new stratum in which tuberculosis can spread with great rapidity. Industrial populations, especially, tend to concentrate; and, while the concentration of families of industrial workers is as yet not a problem in Massachusetts, unhygienic living conditions prevail in a great many areas, and their effects are bound to be felt locally in the near future. In such areas where sanitation is absent or limited, a terrible health problem is created which will undoubtedly be reflected in the mortality statistics for tuberculosis. In considering the probable rise of tuberculosis in industry, other factors must be taken into consideration. Negroes, a particularly susceptible group, are more widely employed; and, while undoubtedly employment will raise their standard of living, they nevertheless offer an excellent focus for the possible spread of the disease, especially in crowded industries. Another factor is the employment of women, another susceptible group, many of whom will attempt to carry on domestic duties and hence experience more fatigue and an increased susceptibility. During the last war there was a definite increase in tuberculosis in females directly proportional to their employment as munition workers.

The Massachusetts Department of Public Health, in its statistical review in 1940, stresses the need for case finding in males, especially those in middle life, as the majority of deaths from tuberculosis occurred in this group. It is this same group that is now finding employment in industry, and therefore it is almost certain that the incidence of tuberculosis will rise still higher in this group as the strain of wartime production begins to be felt. Factors such as the speeding up of production, increased fatigue, greater tension at work, longer hours and unfavorable crowding both in the factory and in the home will also tend to increase the mortality rates. It should be pointed out, however, that as yet in Massachusetts this rise has not occurred, but it is reasonable to anticipate it.

In peacetime emphasis is placed upon finding the case early, for our best chance of saving a life is in such early cases. The method of case finding which has

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proved to be the most fruitful in discovering new cases is to limit examinations to those groups in whom it is known that a greater percentage of infected people is apt to occur. These have been: (1) household or other intimate contacts; (2) non-contacts who have symptoms referable to the chest; (3) racial groups, such as negroes; (4) low income groups. Since practically all cases of active tuberculosis can be diagnosed by x-ray, all large public health agencies interested in tuberculosis are equipped with diagnostic x-ray. These public health agencies have been taking x-rays among individuals belonging to these groups, and the means are still at hand and should be used, as these groups are still the most fruitful sources of case finding. However, the war has injected several new elements. The practicing physician, hurried and harried, is apt to dismiss lightly or overlook trivial symptoms suggestive of tuberculosis and hence fail to have the chest x-rayed either privately or through the public health agencies. On the other hand, patients are not so apt to seek medical advice; being "pepped up" by high patriotic fervor, they will avoid seeking professional advice on what they interpret as trivial symptoms.

IN RECENT years the technical advances in radiology have opened up the possibility for a program of case finding that would have been dismissed as unattainable a few years ago, that is, the x-raying of a sizable portion of our population. All will agree that if this were possible the control of tuberculosis would become a simple problem. The 4 x 5, or 35-mm., fluorographic technique has been put on a sound enough basis so that we can state that it can be depended on to detect practically all of the significant lesions of tuberculosis. This depends, however, a great deal on the skill of the technician and the ability of the interpreter of the films. In the near future the Massachusetts Tuberculosis League will own a mobile 4 x 5 x-ray diagnostic unit which, of course, will be available for use in industry. With this weapon it is possible to approach the large mass of people in industry for mass survey for case finding. If the open case is removed from contact with his fellow worker, the spread of tuberculosis will be reduced; and its potential rise as the strain of war production grows greater will be avoided.

From September, 1940, to October, 1942, Selective Service in Massachusetts has discovered 1592 cases or suspected cases of tuberculosis, two-thirds of them with minimal lesions. Not all of these cases are clinically significant, as only about one-third were regarded as needing medical treatment. The standards of the Army are promulgated to prevent potential breakdowns among inductees, and for that reason many were rejected who undoubtedly will be able to carry on perfectly well in an industrial environment. The incidence in the first part of the study was 0.5%, but it has gradually risen to 1.7% as more men in the older age group were examined. There were no significant differences in different parts of the state. It is interesting to note that a number of advanced cases with positive sputa were found who had absolutely no clinical evidence of illness.

Industry, which represents a concentration of humans comparable to Selective Service, offers a similar field for such case finding; and it is hoped that industry will yet prove to be the most fruitful source for the control of tuberculosis. The difficulties, however, are great; and I wish to bring to your attention the problems that are inherent in the use of industry as a field for mass surveys. The situation is quite complicated, as we have not only the employee to consider but also the attitude of the employer, the attitude of the labor union, and the attitude of the insurance company—all potent forces which must be blended and harmonized in order to achieve the use of industrial populations as a field for mass surveys. Therefore it would be well to sketch briefly the background of each one of these forces which has molded its present attitude toward tuberculosis in industry.

THE function of an industrial medical department is to assist in manufacturing, and to justify its existence it must keep down the amount of illness and its cost to the plant. It should be recognized that this is its first function and that any general benefits that accrue are incidental. This is no accusation that industrial medical departments are inhumane or unconcerned about general welfare; in fact, the presence of a medical department at all speaks well for the health consciousness of that particular plant. Nevertheless, industry itself will admit that it is not especially interested in the general health of its employees except as it relates to occupational diseases. This can be illustrated by stating that very few industries, even those with adequate medical departments, keep records of ordinary sickness among their employees. Tuberculosis case finding is, however, frequent in industry. This has developed as a result of the functions of an industrial medical department, since employee examinations are made for the detection of physical impairment and diseases among workmen. In order to do this, pre-employment and periodic examinations are done. Examinations are also made frequently when a worker is to be transferred to another department and when he re-enters employment after an absence due to illness. Also, most industrial medical departments will examine a worker at his own request. If an x-ray of the chest is a part of the physical examination, then a mass of data is accumulated and a number of cases of tuberculosis unearthed. Once the disease is found and the findings reported to the worker, the responsibility of industry is discharged. Dr. Clarence Selby, Medical Consultant for General Motors, in an address before the National Tuberculosis Association in 1938, succinctly stated the attitude of industry when he said, "The over-all problem of tuberculosis control in industry is one of general community concern. It cannot be segregated within an industry."

The more enlightened and progressive industrial establishments have recognized the importance of good health, and in times of war they recognize it as a positive asset. It is these companies which have been and can be stimulated to partake in mass surveys, such as for the finding of tuberculosis; and, in fact, industry has already made great contributions to the cause of public health by bringing to light many cases. Anyone who has had the experience knows the reluctance of other industries to cooperate, and the endless bickerings that may ensue from such minor decisions as whether the time off should be taken from the employer or employee. In general, industries that have encouraged surveys of tuberculosis fall into two categories, namely, those with well-developed medical departments, such as General Motors and Eastman Kodak —and these usually do pre-employment and periodic x-ray examinations as well—and those with a special interest in possible chest diseases such as may occur in dusty occupations—for example, miners, foundrymen, and grain handlers. Industry is not necessarily antagonistic to the idea of mass surveys, but in order to enlist its cooperation positive benefits must be shown. It is manifestly unfair to expect industry to act as a

social service agency, since it has no such function and makes no pretense in that direction. However, the benefits of a long-range tuberculosis case-finding program are so obvious that I think intelligent and enthusiastic health education could easily convince management of the value and necessity for its cooperation.

Another problem which is directly related to tuberculosis in industry is that of compensability of tuberculosis. The insurance company, which really represents the legal liabilities of the employer, is directly concerned with the problem of mass surveys, especially when previous surveys have shown that immediately following such a survey there is an increase in the benefits paid out to the workers. Dr. Edwards, Director of the City Health Department of New York, states that, during a survey of workers in the garment trades in 1939, unions expended over $10,000 during the first six months following the survey in the form of hospital and other sick benefits. This is natural, as a number of cases of tuberculosis are discovered. The industry and the insurance company which backs it are naturally very much concerned about the compensability of these cases, and unfortunately the law covering tuberculosis as a compensable disease is a maze of judicial contradictions. In general, it is recognized that tuberculosis *per se* is not an occupational disease. However, we can classify those types of tuberculosis which in general have been agreed upon as compensable into four groups:

1. Those cases occurring in doctors, nurses, and attendants who have worked in tuberculosis sanatoria. It is obvious that in these people the disease may be occupational in origin.

2. Workers exposed to silica dust, as silicosis is an occupational disease and ordinarily causes permanent disablement only when tuberculosis is superimposed upon it; and, since it favors the development of tuberculosis in about 65% of cases, tuberculosis has been adjudged compensable in most cases with such exposure.

3. Several cases of tuberculosis have been compensated for in workers who come in contact with large numbers of people in whom there may be a high incidence—such as clerks, waiters, conductors, and others.*

4. A fourth group of cases which has been frequently adjudged to be compensable includes those cases of trauma, such as a blow upon the chest, which may have reactivated a pre-existing lesion.*

Insurance companies are naturally interested in tuberculosis among these four groups, and unquestionably would support case finding among such workers and other potentially susceptible groups. However, a very few of our industrial population fall into these categories; and, while no one except the officials of the insurance companies can speak for them, it would seem likely that they would look with great reluctance upon mass surveys, for they fear the so-called avalanche of claims which may follow. The law in regard to tuberculosis as a compensable disease needs further clarification. It has been argued that if tuberculosis were made uniformly compensable, it would soon be wiped out; but it is obviously unfair to ask industry and the insurance carriers to take upon their shoulders the accrued liabilities of tuberculosis in industry.

Thus far only the salient points that have shaped the employer's attitude toward tuberculosis in industry have been discussed. What about the employee? Unfortunately, there is a great deal of suspicion, ignorance and indifference toward the disease on the part of workers. Workers make up the bulk of the lower income groups of our population, and their level of health awareness is still appallingly low in spite of the steady and persistent educational program of the past years. The fear and shame formerly associated with tuberculosis unfortunately still cling to a great portion of our population. In addition, they are somewhat suspicious of the intentions of their employer. Unfortunately this attitude is not without reason, as unethical employers have often used the physical examination as a basis of discrimination. Since the prospective employee accepts x-ray as a condition of his employment, he has no recourse when he is not hired because of a real or suspected lesion in his chest.

Will he willingly submit to x-rays after employment? Yes, but he must first be convinced of the integrity of his employer. This has been easy where there are well-regulated and ethical medical departments, and in these instances his cooperation is easily obtained. However, in the absence of a medical department or of a strong labor union, he will not willingly submit to x-ray if the information is divulged to the employer.

People will work in hazardous occupations if the financial reward is great enough. Similarly, workers may refuse to give up their job if they have an inactive case of tuberculosis, in spite of medical opinion that their particular occupation is dangerous to them. This is especially true among skilled workers, where change in occupation may be accompanied by serious financial loss. They, therefore, do not wish their employer to know that they are ill or potentially ill. In some states, especially in the South where mass x-rays have been successful, the level of awareness of labor of its rights is low; and in such areas if the employer's cooperation can be obtained, mass surveys can be accomplished without consulting labor. In Massachusetts, where labor is well organized, its attitude must first be ascertained and seriously considered.

IN MASS surveys the agency taking the x-ray must act as a private physician would; that is, any information obtained is confidential between the worker and the agency. But if the employer bears any part of the expense, even if it consists of only giving time off necessary to take the x-ray, he usually insists on knowing the results, and negotiations often break down at this point. It is manifestly impossible for the health department or any social agency to divulge such information.

The function of the examining agency should be to remove only those cases which are dangerous to the surrounding contacts; that is, a minimal lesion which is inactive or healed lesion should not be reported to the employer. A minimal lesion is often associated with positive sputum. Decision should be based on activity, and advanced lesions should be reported even if inactive. This, however, should be decided by the physician or clinic to which the patient is referred by the surveying agency. This would mean that the interpreter of the films must consider each suspicious finding in conjunction with other laboratory data and clinical appraisal. It must be made clear that the principal function of the survey is to remove the danger of an unrecognized open case. If this were done intelligently and carefully, no worker could have any valid objection to having his chest x-rayed.

Labor unions, which, of course, represent the interest of the workers, show as many degrees of enlightenment and awareness of health problems as does industry. Too many of them are still only concerned with

*Note: Groups 3 and 4 are not compensable in Massachusetts except in rare instances.

wages, hours and exploitations, and pay little attention to health and other social problems. The more advanced unions are seriously concerned with the health problems of their members, as witness the survey conducted by the ILGWU and the creation of the Union Health Center in New York City. In that instance in 1939, 26,058 workers in the needle trades were examined by the New York City Department of Health, dealing only with the union officials. In no instance was the employer conferred with, and the x-rays were taken on the workers' own time. The findings in any particular case were a matter of confidence between the department and the individual unless he permitted the transfer of such information by the signing of a waiver. A strong labor union which feels able to protect its sick workers from discrimination is usually cooperative and offers one of the best means of obtaining cooperation for planned surveys. However, there are many industries in Massachusetts which are not unionized. In these cases the problem is more difficult, as it is necessary to educate the worker and obtain his voluntary cooperation as well as the cooperation of the employer.

THE problem has been sketched briefly. We have the tool, that is, the 4 x 5, or 35 mm., fluorographic technique; we have the group—our industrial populations. The necessity of case finding in industry is clear and real. In Massachusetts, sanatorium treatment is available to all without cost if they cannot pay. There are no differences of opinion as to the necessity of combating tuberculosis, but we must reconcile the viewpoints of all interested parties. It means hard work, and voluntary and official agencies must work hand in hand. The basis of control is the same as in any public health movement, namely, education and prevention. The way to prevent spread is to find each case and remove it as a focus by segregation and education. Official, voluntary and special agencies still must carry the burden; and industry, the worker, and the union must be shown the mutual advantages of a positive plan for tuberculosis control. Legal responsibilities must be fixed, and the laws regulating the compensability of tuberculosis must be defined. The problem must be attacked on all fronts and in many ways. If the industry is strongly unionized, it is best approached through the labor leaders. If the trade involves a potential or possible health hazard, that may prove to be the best selling point to the employer. The chief method, however, is still the same: Educate the worker. He will then demand good health protection from his employer and his union.

When industry and the worker realize the terrible cost in manpower and human suffering that tuberculosis entails and that a method of control is feasible, then case finding in industry will be more eagerly accepted and may, in fact, be one of the outstanding contributions toward public health that will survive this war.

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# Control of Health in Industry


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YOU will have gathered from the talks this afternoon that the matter of control of health in the chemical industry is a rather complicated one and could be considered from many angles. We might, for instance, discuss the setting up of proper equipment for carrying on chemical operations, and the safe operation and proper maintenance of that equipment. Or we might talk about protective devices: ventilation, respirators, masks—or protective clothing and gloves, and protective creams for the skin. We might become more chemical and discuss air analysis and so-called "safe upper limits." But, whatever we did discuss, our ultimate goal would remain the same: the maintenance of the best possible degree of health in our workmen at all times. If we think of that goal for a moment we realize that we can never set up any system of control of health by mere chemical study or engineering study—we must know what happens to the man.

If we don't know what happens to the man in his industrial environment, the rest is pure philosophy.

Now you might think, if you have read much of the literature of industrial toxicology, that we know very well what happens to the man. We do know what *can* happen to him continually. We find in the literature some very ghastly descriptions of poisoning by chemicals covering, it is true, only a very few of the chemicals used in industry. There are so many chemicals used in industry or being introduced every week that all of the toxicological laboratories in the world could not possibly keep up with the information on the ultimate action of those compounds.

Dr. Gehrmann has already said that we are not interested in the sick and dead in industry; we are interested in keeping men well; and I have not yet found a plant physician who could keep a man free from TNT poisoning by studying what happens to a man's liver when he is dead of TNT poisoning. Nor have I found a plant physician to whom I can give practical help by saying that the minimum fatal dose to a white rat of a chemical "X" is 10 milligrams per kilogram. How does that help to keep a man well?

HASKELL LABORATORY has been faced with a very practical problem. It was founded to give to the medical division information which could be used in our plants to prevent sickness among our workmen; and although all the literature in the field was available to us and we were given library facilities and the ability to buy all types of journals in all languages (including Swahili if we wanted it) we still could not get the information on how to prevent sickness in our men, because industrial literature does not deal with that aspect. You cannot write an article about industrial poisoning in a man who isn't poisoned.

Moreover, the close supervision of workmen in industry is not easy; it has never been easy. In the first place one finds apprehension on the part of the management, or on the part of the trade unions; in the second place one is faced with the fact that industry is in industry to produce materials and not medical records, and any medical examination of a man requires that he be away from his job. Therefore, if one

This is the text of DR. FOULGER'S Lecture, Tuesday evening, November 10, in the Post-Graduate Course in Industrial Medicine given by Long Island College of Medicine, November 2-13, 1942. This Lecture was preceded, on Tuesday afternoon, by DR. KEHOE'S Lecture on "Hazardous Materials and Operations," and DR. STERNER'S Lecture on "Industrial Toxicology: Determining Margins of Safety."

is to study men in industry while they are in industry and not while sitting for two hours in the doctor's office, one must devise and use methods which will not keep a man away from his job for more than a few moments and will, at the same time, give a maximum of information which is to the point—information that is not opinion, information that is subject to measurement and statistical analysis.

It is not very easy to find methods which satisfy those criteria, and we have spent at least five years in studying the field and in testing various procedures. We have succeeded in finding two procedures which we have applied to the study of men in plants and at the same time to the study of animals in the laboratory by exactly the same processes, the animals being under carefully-controlled conditions as to atmospheric concentration, temperature, etc. The results of those studies give us a basis for setting up programs for watching the workmen in our plants and knowing what does happen to a man from the time he first enters a job which involves exposure to what might be hazardous chemicals to the time when—if we are careless and our preventive measures have failed—he gets an early case of poisoning.

When we use such procedures to detect the earliest possible signs of change from the usual or what we incorrectly call "the normal health" of the workman, we find, in the first case, that there is no such thing as specific action of chemicals. Carbon tetrachloride, trinitrotoluol, benzene, toluene — any chemical you choose to mention—in the first stage of action upon the human or animal organism in concentrations which are just adequate to have a general action, each and all chemicals produce the same train of events. Nor is that train of events specific for chemicals as we meet them in industry. It can be the result of exposure to chemicals in medication, or to abnormal chemicals produced in the body by infection, or to infestation with parasites, or to abnormal chemical conditions produced in the body by disturbances of metabolism.

If one introduces into a living organism a chemical foreign to the body in a concentration just adequate to have any action upon the body in general and not upon any one local spot, there appears to be an interference with the oxidation and reduction mechanisms going on in the individual cells of all the tissues. But certain tissues of the body are more sensitive to slight changes in the chemical oxidation processes than are others, and we have reason to believe that the cells in the middle brain, in the region of the hypothalamus, and the cells around the floor of the fourth ventricle and medulla oblongata are much more sensitive to these changes than are other cells of the body. As a result, the very earliest signs and symptoms of exposure to this very slight concentration of the toxic chemical are as follows:

Among symptoms, an unsual degree of tiredness or lassitude or fatigue—whichever you choose to call it; headache, probably due to a widening of the blood vessels in the brain and a congestion of the brain and, therefore, production of pressure; disturbances of the stomach and intestines; loss of appetite, nausea; sometimes vomiting or diarrhea; a feeling of distention of the stomach with gas or frequent eructation of gas and a pain in the epigastrium.

Those symptoms could occur from two sources; from stimulation of the hypothalamus and the sympathetic nervous system which would lead to disturbances in the secretion of gastric juices and in the emptying of the stomach and indigestion in general, or stimulation of the medulla oblongata and the vagus nerve which would lead to symptoms of nausea, sometimes a slowing of the heart, or disturbances of the digestion and the emptying and filling times of the intestines and stomach.

In addition to these gastro-enteric symptoms, fatigue and lassitude, there is very often palpitation, which is really an awareness of the beating of one's own heart. If one lets this exposure continue, these symptoms become either more frequent or more intense, and one may find, added to them, pain or tingling in the extremities, or pain in the neck, or sometimes dyspnea on very slight exertion.

Now all of these symptoms do not always occur in any one case; but fatigue or lassitude is almost universally present, and it is extremely important in any problem of prevention of injury or sickness in industry.

THE signs of this early action of chemicals are more important from the point of view of a study of what happens to men, because there is a considerable degree of unreliability about the relating of symptoms. In the first place, very few medical men are trained at cross-examination, and we are rather clumsy in our questioning of patients. We can put leading questions and get almost any answer. If we were trained as lawyers then we might get better results. In the second place, a man's description of his symptoms is a matter of opinion, not amenable to any measurement; no two men will describe the same symptoms or the same degree of pain in the same manner, and certainly one cannot express that degree in figures—it is not susceptible to statistics.

Thus while one cannot entirely ignore symptoms, one must not pay too much attention to them; and one must certainly not jump to the conclusion that, because a man in industry says he has never had any sickness or any symptoms, he is not affected by his work. Nothing could be more fallacious. Usually in such cases you find, when a man really gets ill and may collapse at his job, that his wife or his pals could tell you of similar attacks in the past.

We are, therefore, interested in a proper recording of what happens to a man in facts that can be measured. And we have found two things which we can measure without using any elaborate equipment and requiring but a short time away from the job. One of those we have developed to a considerable degree: the measurement of trends in blood pressure. The other has not been developed enough to be used in general: a measure of the change of the frequencies making up the first heart sound—a very sensitive method, indeed, and one which we hope within a year or so will be available for use in industry.

WHEN we apply these methods in industry, what do we find? By studying men starting work in a new plant, men selected for the job by pre-employment examination, men exposed to a chemical, or intact animals under controlled conditions with no anesthesia, we find that a man or an animal can withstand the action of a low concentration of a chemical for a varying period of time without showing the least departure from his usual state of physiology, as indicated by our rather sensitive measurements. The length of that period depends upon the particular physical properties and perhaps chemical properties of the chemical in question. It is usually about three or four weeks, with an exposure every day of some six or eight hours.

Eventually, if the exposure continues, there will come a time at which, while the animal or man is perfectly normal so far as we can find at the beginning of the first day of the work week, he will be just detectably abnormal at the end of the last day of the work

week. Yet the week-end of rest, if it is proper rest, can restore him to normal. If, after this, the exposure continues, there will come a time at which, while being perfectly normal at the beginning of each day of work, a man or animal studied is just detectably abnormal at the end of each day of work; but a proper rest overnight will restore him to normal.

The next stage is such that the man is no longer able to return to normal with a simple night's rest and so, as day after day progresses, he will depart further and further from a true physiological condition. Yet still a week-end of rest will restore him to his usual health. But finally, if the situation is allowed to continue, a week-end of rest is not adequate to restore him to normal, and, as weeks go by, there will pile up a degree of abnormality which will eventually lead to definite poisoning.

This trend of events is not specific for any one chemical. Hydrocyanic acid can cause it in low concentrations; carbon tetrachloride, carbon bisulphide, diphenyloxide, trinitrotoluol—any chemical you choose to mention—we have reason to believe, will produce just this same picture. But this train of events can also be produced by diseases, by malnutrition, by injudicious medication, by drugs—especially synthetic drugs, by deprivation of oxygen such as occurs in high altitudes or in working in closed spaces, and by injudicious exercise leading to fatigue. Moreover, once an animal or man has gone beyond that first stage of apparent tolerance to his exposure and has reached the stage such that at some time during the week he shows a departure from normal physiology, he is very much more sensitive than usual, either to a slightly increased concentration of the chemical with which he is working, or to another chemical, or to disease, or to fatigue, or one of these other agents; and he will react to such a change in concentration in a manner which may be almost explosive, and quite different from the reaction of a man not before exposed but suddenly put in an environment at a much higher level of a chemical.

If one takes an animal exposed, for instance, to vinyl cyanide until it just begins to show a departure from normal as indicated by the most sensitive test we have —this heart sound method—and exposes that animal for five minutes to 50 parts per million of nitrous gases, the animal will be in a condition of circulatory collapse before the five minutes are ended, and will rapidly develop pulmonary edema, whereas such an exposure to nitrous gases only will not affect an ordinary dog. That is a very important reaction. It is important, first of all, because it is probably the reason in some cases for so-called "idiosyncrasies" and, second, because many severe accidents in industry are due to temporary unusual reaction of an individual to an environment which would ordinarily not affect him.

BEFORE going into that further I think we should talk a little about factors other than industrial chemical exposure. We hear a lot of talk in these days about nutrition. There are many committees—committees of the National Research Council, the A.M.A., and some states have their committees—all on this question of whether or not the nation at large, and particularly the war workers, can be said to be properly fed. I don't think there is any doubt now in anyone's mind that we have misled ourselves as to the real adequacy of our diet, no matter whether we base it upon our earning power, social status or anything else.

We have tended to argue that, because the vitamin content, for instance, of fresh vegetables and the food that is fresh in the market, is adequate for what we think should be the daily intake, the food we eat is necessarily adequate. We have neglected altogether such important factors as seasonal variability in nutritional values of food stuffs, losses of valuable vitamins in transportation and storage, and the very bad effects of the drastic manipulations which food may undergo in the kitchen.

Such studies as have been made—and there are a number in progress—indicate quite definitely that many of our working population are not adequately fed. In a Lockheed plant in California an experiment has been conducted for several months. In that particular plant, incidentally, about 10% of the men attend first-aid posts every day as a result of minor accidents or disabilities. It was found in the group under study that some 40 to 45% were deficient in daily intake of vitamin C as shown by blood-level measurements and analyses of food intake. Those men were living in the citrus-growing region. They were deficient because they only took their vitamin C as fruit juice. They only took their fruit juice if they got up in time to have breakfast. They often didn't get up in time. Some 40% were deficient in vitamin A, and I think, some 10 to 20% deficient in riboflavin.

The same story has been found in other plants. We know very definitely from our studies that workers exposed to toxic chemicals need an optimal vitamin content in their daily food, particularly of vitamin C and the vitamins of the B group. Without those optimal daily intakes (which they should get in their ordinary diet without supplementing the diet, if they are properly advised) they run the risk of developing early physiological changes and perhaps, eventually, toxic conditions. This is a very important consideration in war plants in TNT production, and in shell-loading plants or plants in the rubber industry in which workers must necessarily be exposed to benzene while cementing together, for example, parts of blimps and aerial equipment of that type.

But not only with regard to vitamin content may our workers be suffering from improper nutrition; there may also be improper distribution of food during the day. Interesting information came from England in the last war from war plants in which there was a considerable degree of sickness from TNT poisoning. In a Symposium by the Royal Society of Medicine in January, 1917, entitled "The Origin, Symptoms, Pathology, Treatment, and Prophylaxis of Toxic Jaundice observed in Munition Workers,"* Viscount Chetwynd, managing director of a filling factory for the Ministry of Munitions of War, stated:

"Incidentally I must mention that I had been much impressed with the considerably larger number of gastric cases among women than among men. This led me to make inquiries as to the food the women were in the habit of taking, and I found that, whereas the men would have a substantial meal, the women would satisfy themselves with a bun or two and a cup of tea (over here, a biscuit and a Coca-Cola). I decided, therefore, that it was to the interests of the factory that the women should be properly fed, and that it was obviously impossible to force them to buy suitable food. The only thing to do was to make some deduction from their pay and feed them, and this was put into effect. Although the deduction made from their pay does not cover half the expense of feeding them, yet the extraordinary improvement in their health makes it a satisfactory financial transaction for the factory, as the percentage of gastric cases among the women since they have been fed has dropped from 11.6% for the week ending September 2, to the neighborhood of from 1 to 2%, falling as low as 0.7% for the week ending January 13."

*Published by Longmans, Green, and Company, 39 Paternoster Row, London.

Now the distribution of food stuffs during the day is equally important over here, whether we fail to eat big meals because we are afraid of gaining too much weight or whether we have financial reasons for not eating good meals. But there should be a proper distribution of meals throughout the day if we are to withstand the action of poisonous chemicals. That proper distribution must include the night shifts. We know very well that men coming off the night shift show a higher degree of physiological abnormality more frequently than men working on the day shift.

MEDICATION can be very important. Don't forget that drugs are chemicals, and that many of the drugs we have acquired the habit of using are synthetic chemicals of the same type as those against which we are trying to protect our workers in plants; and, further, that physicians are prescribing routinely much higher concentrations of those synthetic chemicals than the concentrations in the atmosphere of our plants about which we are much concerned. We are just waking up to the fact that drugs which are very useful and very valuable as life savers in the proper place are as dangerous as an automobile badly driven in the wrong place.

The sulfa drugs are being used wrongly far more often than they are being used rightly. They are being used for conditions from "flat feet to falling hair," almost without medical control, and they are causing trouble. The first hint of that trouble appeared in the literature in 1940. The *Journal of Aviation Medicine* published a letter from a flight surgeon in the American army air service (he obviously could not give his name) in which he said that the British have found that a single dose of sulfanilamide will lower the ceiling of a pilot about 5,000 feet. "They have already had trouble from it, and we have already had one death and two other crashes from it." Now the pilot's ceiling—12,000 to 14,000 feet—is the level at which he can fly without needing oxygen. If he flies beyond that level without being supplied oxygen he will pass into circulatory collapse, and become unconscious; and if he does not die while unconscious from complete failure of circulation he may die because his plane crashed. Under normal circumstances he will have 12,000 to 14,000 feet in which to recover consciousness; but if you give him sulfanilamide he will only have 7,000 to 9,000 feet, which is not ample for recovery of consciousness and recovery of control of the plane.

Soon afterward the aeroplane companies in this country refused to let the fliers fly if they had been treated with sulfanilamide; and recently the Medical and Surgical Committee of the Association of American Railroads has recommended that no man who has been treated with these drugs should resume work with a locomotive for from seven to 14 days after treatment. The same, of course, applies to self-treatment with "pick-me-ups" other than tomato juice.

Unnecessary exertion leading to fatigue can also supplement the action of chemical exposure in industry or bring about such a condition that chemical exposure may lead to disaster.

In the use of paint sprays or solvents of any type in household or in industry, inadequate ventilation, which means inadequate oxygen, can also increase susceptibility of individuals to the action of chemicals.

Now you will see that most of those conditions are not due to industry itself but are situations necessarily under the control either of the worker or of the plant physician, or of the family physician. Each of these groups, as well as the management—which should supply proper equipment and proper medical service, and allow periodic medical examinations—must work together if we are to prevent sickness and accidents-following-sickness in industry.

No group can be successful unless each other group as a whole works with it. We have before us not only a problem of setting up proper programs of medical control by clinical methods, but also the very great problem of education of ourselves as physicians in industry, of physicians not in industry, of workers, so that we can all work in the necessary spirit of cooperation.

## Discussion

DR. GEORGE H. GEHRMANN, Medical Director, E. I. du Pont de Nemours & Co., presiding:

QUESTION: I would like to know what DR. FOULGER thinks of supplying industry with synthetic vitamins.

DR. FOULGER: There is a great deal of controversy on that question. The facts are: the men must have adequate diets if they are to be protected; this country has carried on so-called "programs of education" for years—there have been more fads and food fancies in the United States, more dissertations over the radio and in women's magazine's, than anywhere else in the world; and still people eat pork-and-beans in some parts of the country and bran in others. Now we are in the middle of a war. We depend upon producing materials. We had some 470,000,000 man-hours lost last year because of illness and accidents. Are we to be academic and say, "Oh, it's terrible to give a man a 'shotgun' dose, because he might excrete all of it without using some of it?" Are we to try to set up cafeterias in plants when we can't get more than $5,000 worth of materials to build a building because WPB won't allow it? The answer is to buy 2½ cents' worth of vitamins and give it to the men as a practical solution of a practical problem.

DR. GEHRMANN: All of our men who are exposed to certain chemicals are getting a multiple vitamin capsule every day—an especially prepared capsule which contains 100 milligrams of vitamin C. That we give them—men working in TNT, for example, nitroglycerine, nitroglycol, and several other compounds. Those who are not directly exposed to chemical substances are sold vitamins at cost. From a practical standpoint, when you try to interfere with a man's diet it is a very difficult thing to do. He eats what he likes and discards the things he doesn't like. And then, in many of our plants, we have a large percentage of foreign element. When you try to go into the home and talk to the housewife and say, "Your good husband should have grapefruit and orange juice for breakfast," she says, "My husband works all day and has to have meat and potatoes"—and that's the end of it. There are many fancy theories that amount to butting your head against a brick wall. If you want to try them you will meet with a lot of opposition and a lot of grief, and you won't accomplish what you set out to do.

QUESTION: What do you supply of vitamin B; or what would the doctor recommend as a protective dose today?

DR. FOULGER: We have tried to get a scientific basis. In the case of $B_1$, a man, I think, should have what is recommended by the Council on Nutrition in Industry of the National Research Council. I think it is about one and one-half milligrams of $B_1$ each day. The table as drawn up in the report by the National Research Council seems to me an optimal table, and is desirable for the intake of a man in a chemical industry. He might get quite a lot of it from his food; but how are we to know that? I think it is better to give to these special jobs such as shell-loading, a capsule containing the optimal requirements set up, not by the A.M.A. Council, but by the Council on Nutrition of the National Research Council.

DR. GEHRMANN: You might be interested to know, Doctor, that we have made a lot of TNT. It was pretty tricky stuff to handle from the health standpoint, but we have not had a case of TNT poisoning. We haven't had an explosion, either; you might be interested to know that also.

QUESTION: Do you mind telling us whose capsule you use?

DR. GEHRMANN: We use the capsule of any reliable drug house. Our last order was for 1,000,000 capsules.

QUESTION: Do you give the exact proportions in the capsule you want?

DR. GEHRMANN: We specify the capsule we want. We are using the daily dose which is recommended by the Drug and Cosmetic Act of the Department of Agriculture. It simplifies labor. For example, they say that 5,000 units of vitamin A constitute the minimal daily dose; and, according to the law, if your capsule should contain, for example, 10,000 units, then the label would have to state "This capsule contains twice the recommended daily dose." So we are using the capsule recommended by them in order to simplify labeling.

QUESTION: What method do you use to distribute it to the men? Do you give it to them in their pay envelope?

DR. GEHRMANN: No. The most satisfactory method we have is for a man to go around and give each man his capsule each day and then check him off the list. We are not able to do that in all plants, and where we are not able to do it we give them a sufficient number of capsules to last them for one week and then they come back for more. And, of course, we are not 100% certain that they take them; but the men in general say that when they are taking them they feel better, and anything that makes them feel better is easy to get them to take.

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## Surgical Management

*—Of Industrial Injuries—*

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*New York*

WHAT I have to say this afternoon is in connection with a certain number of controversial subjects, and I shall try to speak in terms of my own personal impressions. My link with industrial surgery is very close, and my link with men who have been working in that particular field is also close. One of the gratifying things in connection with that is the increasing place it has taken in the surgical world in general, and in the industrial world, the employee world. I remember the time not so long ago when men who were in industrial medicine were likened to men who were in insurance—they were failures. That time has gone by.

I have, perhaps, had something to do with putting traumatic surgery on the map. I wrote a book in 1917 on traumatic surgery and had a great deal of difficulty in selling the title to the publishers. They said there was no such thing as traumatic surgery, i.e., in 1917. In that year there was hardly any segregation of the traumatic type; it was part of general surgery. As an example, the handling of an injury that came into the hospital was gradually relegated down the line and finally got down to the lowest member of the staff. A fracture was the last item on the operative list. A fracture would come in on Saturday and finally on Monday would be x-rayed, and perhaps the doctor would see the film on Tuesday. It is not that way any more.

I don't think there's anything worse from the standpoint of surgery than the treatment of wounds of the hands. What is more important to a man than his hands? Where would we be without a hand? To this day hand surgery is one of the most poorly-done things we do; worse than fractures.

I have three general subjects: (1) Minor injuries of major importance; (2) Fractures; (3) Burns.

In so far as minor injuries of major importance are concerned, I put them under four classifications—puncture wounds, lacerations, contusions and sprains, and foreign bodies.

### Puncture Wounds

THE danger of a puncture wound in terms of infection is out of all proportion to the external manifestation, because the puncture wound has the element of a definite implantation. Now what is the depth to which the implantation penetrating wound can be of lethal extent? Below the fascia level a sub-fascia implantation is the dangerous level. A felon is a sub-fascia implantation. It is a trivial or forgotten puncture wound that happened usually 48 hours ago, characterized by throbbing pain, walking the floor and elevation of the finger; a trivial forgotten incident followed by marked manifestation.

Another sub-fascia is a puncture wound on the palm of the hand. What covers the palm? Fascia. A claw hand can be the outcome of a palm puncture wound.

The upper extremity is the lower extremity in diminutive. What happens to the upper, happens to the lower. When I say hand, I also refer to the foot. If a puncture wound attracted the attention of an employee, he would do something about it. This is a minor injury of major importance.

Sliding down ropes is another thing that causes infection. Usually this occurs on the shin bone and may induce bone injury. Let us never forget that once an osteomyelitis, always an osteomyelitis.

### Contusions

THERE is one contusion I want to call your particular attention to. Usually you get rid of an ordinary contusion in a short time. Sometimes, however, you do not. I refer to a contusion of the buttocks. There may be considerable effusion, and the situation becomes a serious one. Why? Because of secondary infection due to meddlesome interference.

Contusions of the shoulder joints are serious because they often affect the bursa and plexus.

### Sprains

I HAVE in mind two sprains, one of the ankle, and one of the wrist. These are minors becoming majors. Know the difference in diagnosis between a sprain and a fracture. Be careful about this in those two joints. Too many cases are let go by because they are supposed to be a sprain of the wrist or ankle when in reality there is a fracture. Local tenderness in trauma is just as diagnostic as it is in general surgery. In a sprain it hurts here, there and everywhere. In the case of fracture it is local and focal. In a sprain it is general and focal. Beware of the local and focal.

### Foreign Bodies

WHAT is a foreign body in terms of your troubles and my troubles? In these cases you get infection plus the foreign body. This is usually a metallic fragment. In World War I we had dozens of pieces of apparatus for locating foreign bodies. The Bergonnie apparatus was the best one. We used to have it over the operating table. It looked like a flower pot covered with a sterile towel suspended above the table. It was brought down over the wound, and when you put your hand between the wound and the apparatus you would get a vibration; and where you got the greatest vibration was supposed to be the location of the foreign body.

All sorts of magnets have been used. About two years ago we thought we had something, but we didn't. About a year ago I tried out this new piece of apparatus[1] on a cop who had 67 pieces of metal in his body. We found them with the machine. I didn't use x-ray. I took this machine to the Army hospital, Hawaii, in the Pearl Harbor attack. Its greatest success was in locating a bullet in the spinal canal at the level of the second lumbar vertebra. I had done a laminectomy and couldn't find it. I sterilized the end of the probe of this apparatus, put it along the wound, and found it.

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The text of DR. MOORHEAD'S Lecture at the November 12, afternoon session of the Course in Industrial Medicine at Long Island College of Medicine, November 2-13, 1942.

THE second heading has to do with major injuries. Let's get down to things that are of major importance from the onset: (1) wounds; (2) fractures; (3) burns. These are the three things which engage most of the interest of the men in industrial surgery.

If we try to get wounds into some kind of fairly definite classification we can say we have two general classifications: incised and lacerated. From the standpoint of symptoms I don't say anything, but from the standpoint of treatment I say a great deal. Certain things have to be done irrespective of the site of the wound. What are they?

1. THE TIME ELEMENT; the elapsed time since receipt and treatment. I don't mean first aid treatment. What is the elapsed time? There is, in the history of every trauma, what I call the golden period of treatment. This is six hours post-trauma. Every hour after that is not so good. What is the analogy? You get your ruptured appendix in six hours and your chances of recovery are greater, but after that your mortality rises. Why? In the first period you're operating on one piece of pathology. After that you're operating on pathology *plus* complications.

2. THE CLEANSING ELEMENT. What is it? Soap and water. What about the antiseptics? The more colorful they are the less valuable. Wash the wound with soap and water.

3. DEBRIDEMENT. What is debridement? It started in Napoleon's wars in 1814. It was used in 1917 and 1918. It came from Baron Larrey, surgeon-in-chief of Napoleon's army. It derives from a French word, *debrider*, which means to unbridle. If you take away all the bruised and damaged tissue then you rob the organisms of anything to live on; that is the rationale of debridement. How do you know when you have done enough? Take out in terms of three criteria: (a) parts look normal; (b) parts bleed; (c) parts contract. When you have done these three you have done enough.

4. SULFANILAMIDE APPLICATION. The idea about this is that if by any chance we have left any organisms in the wound, or debridement has not been as effective as it might be, we put in a liberal coat of sulfanilamide.

5. SUTURE ELEMENT. On big wounds no sutures whatsoever. Put on a sterile dressing; a big dressing. Immobilization in wounds of soft parts is just as important as in a fracture. With a small wound put in sutures, but don't bring them together until the end of the third day. In the small wound seen within the time element of six hours, washed with soap and water and dusted with sulfanilamide, put in sutures but drain it. Every wound that is not made with surgical intent is already infected. If this were not so, why sterilize?

6. DRESSING. If the wound is near a joint put a splint on it. Immobilize the same way you would a fracture.

7. POSTOPERATIVE TREATMENT. Sulfathiazol, gr.XV q4h, for three days postoperative or post-trauma. Don't dress them until the end of the third day. If you dress them before then you may reinfect them, even from the dust in the room. If you don't dress them early they're fairly well sealed. If you do dress them, put on a mask. These are the elements that go to make for success in the treatment of wounds.

8. INFECTED WOUNDS. The infected wound is characterized by redness and swelling. I like to put on a hot wet dressing of mag. sulphate. I cut for localized fluctuation. I cut for localized induration. I cut for localized tenderness, and when I cut I cut deep enough and long enough so that it will be self-draining. Stuffing with gauze isn't surgery, it's taxidermy. I never operate on a carbuncle or boil. You reinfect them. Don't cut them unless they are soft. Don't cut unless you have localized tenderness, fluctuation or induration.

9. FRACTURES. What is a fracture? A fracture is a wounded bone. What kinds of wounds of bones can you have? Lacerated and incised. There are two types of fractures—Type 1, displaced fragment; Type 2, nondisplaced fragment. Those things are just as different as lacerated and incised wounds. What about transportation? The main thing to do is to make the leg straight, make the arm straight. The simplest thing to do in fractures of legs and thighs is tie the two legs together. Tie the arm to the side of the chest. The best temporary splint is a pillow. Nothing is better for arms, legs, pelvis, or chest. In treatment of fractures after they get to the place where they can be treated, i.e., to the hospital, we again have the rule as to the golden period, the first six hours. Provisional traction is one of the best of all. If you are called to a patient's house and he cannot be transported, it is a very simple thing to rig up provisional traction. What is the rationale of traction treatment? It is that every fracture and every dislocation is set by setting the muscle, not setting the bone. For dislocation of the shoulder have the patient lie face down on a table and tie a weight on the outstretched hand and let it stay there, and dislocation will be reduced. I am a great believer in skeletal traction. I don't like open operation.

10. BURNS. This is the most controversial thing there is. What is a burn? A burn is a wound due to thermal, chemical, electrical or radiation sources. What kind of burn wounds are there? Massive and minor; first, second and third degree. There are some things we all agree about on burns. We all recognize that they are wounds and that the infection element is important to avoid. The cleansing side comes in with soap and water and debridement. Next we know that a burn is going to shed fluid, and fluid loss is important in burns. Try to overcome fluid loss, treat for shock. Canned plasma is definitely better than blood in burns. On all of these cases don't forget the shock reliever par excellence, particularly in burns. Stop the pain. When a patient is hurt, it hurts. Don't give 1/6 grain of morphine. Give ½ grain. Give a good big dose. However, if an individual has been unconscious it is unwise to give morphine.

11. DRESSINGS. We dress burns with sulfanilamide and sulfathiazol, each 1½% in mineral oil, cod liver oil or vaseline. The dressing should be changed as often as necessary. It won't have to be changed often if you put on a good big heavy dressing. Anticipate contractures if the burn is near a joint. Make the patients stretch their arms and legs. Keep them in motion. For smaller burns of the face I give them chewing gum to prevent contracture. The best thing for an extensive burn of the body is to put the person in a bath of 5% bicarbonate of soda once or twice daily. For finger burns, get a pair of cotton gloves and put fingers loaded with this material into the gloves and make them move the fingers. The same thing with the toes. Mobility is one of the things we have to keep in mind.

## Controversial Problems

HERNIA. The so-called industrial hernia, occupational hernia, traumatic hernia—call it what you will.

1. A single isolated given trauma never causes an inguinal hernia. The cause is always a congenital preformed sac.

2. Hernia is a disease, a slowly developing disease on a congenital basis. It develops in much the same way as any congenital disease and isn't noticed until something brings it to the person's attention. Can it be aggravated by a given incident? Yes; it can be aggravated by any act of violence which produces intra-

abdominal pressure. There is no incubation period in trauma. The act occurs, the effect is right there. In my experience I found, first, that I had to stop doing hernias under local anesthesia. Second, when I operated on hernias which were supposed to have occurred yesterday, I found a terrible lot of adhesions. Another thing I found was the sac adhering to the cord. The next thing was that I couldn't tell the difference between a young hernia and an old one. Do you mean to tell me that a person because of a certain act of violence could push a piece of intestine through two openings without having immediate knowledge of the onset, without having appropriate symptoms? That just doesn't occur. I came to the conclusion that a man is entitled to a claim for aggravation of a pre-existing condition.

PAIN IN THE BACK. The other controversal subject is the back trouble. The popular thing to say now is that the patient has an intervertebral disc syndrome. Let's get rid of this intervertebral disc thing. It's very rare. I've seen three that I think are really disc cases. Only three. The so-called disc case is often an intraspinal tumor. It gives manifestations by characteristic symptoms. These characteristic symptoms are:

1. Persistent and resistant pain.
2. Sciatic combination that goes with it.
3. Changes in the reflexes.
4. Impairment of the sensory distribution of the afflicted leg.
5. A rise in protein content in the spinal fluid.
6. X-ray which shows defect in the canal.

Until these things are determined, I ask of you not to jump at the diagnosis intervertebral disc syndrome. Let's take what usually and ordinarily happens. Put these back cases into the ordinary classes. What is the spinal column? It is a set of articulating joints. In other words, what happens to any joint could happen to the intervertebral joint.

Now, about the diagnosis? How do you make it?

First, how did the patient get hurt? Then inspect the patient. Watch how he walks. Watch him take off his clothes. Watch him take off his shoes. Strip him. Make him parade for you. Watch for flat feet, varicose veins, twisted spine. Are his shoulders at the same level? There are three or four signs: the way he acts; localized pain; spasm of muscle. Local pain is just as important in traumatic surgery as in general surgery. Local and focal is the thing you are after now, and spasm of the muscle. Remember: (1) manner of receipt of injury; (2) attitude before you; (3) localized tenderness and spasm of muscle. X-ray? Yes, it is important and motions are very important. I give compass exercises as part of my treatment. I also believe in manipulation in cases of myositis and contracture of muscles.

ARTHRITIS. I wish I knew something to do for arthritis. In so far as arthritis and fractures are concerned, if a patient has a fracture and has arthritis, he nearly always goes on and unites well. However, arthritis can complicate a fracture. As to treatment for these arthritic joints that have been injured, you are in for a good deal of trouble.

1. Here DR. MOORHEAD referred to the "Locator," described in the general press immediately following his use of it at Pearl Harbor. The following questions and answers accompanied his demonstration:

Q: Could this be used for microscopic foreign bodies in the eye?

A: Yes, but it would require a smaller probe. They are now supplied.

Q: What do they sell for?

A: At the present time $350. As production increases it is hoped they will be reduced.

Q: Who makes it?

A: Waugh Laboratories, in the Graybar Building, New York City.

Q: Is it equally effective in hard and soft tissue?

A: Human tissue makes no difference at all.

## Skin Hazards

*—In the Manufacture of Glass Wool and Thread—*

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ROCK WOOL and asbestos have been used as insulating materials for many years and the skin hazards involved in their manufacture and use are well known, although few cases of dermatitis resulting from the handling of these materials have been reported. Fiberglass is a relatively new type of commercial insulating material* concerning which, as a cause of dermatitis, there is little information available. However, from one source the following is obtained: Of more than 4,000 case records submitted during the past year by state compensation boards to the Office of Dermatoses Investigations of the Division of Industrial Hygiene, National Institute of Health, it was found that only 16 cases of dermatitis were attributed to the handling of insulating materials and that eight of these were attributed specifically to glass insulating materials.

An investigation of the skin hazards in the manufacture of glass wool and glass textiles, requested by a group of workers handling these products, was undertaken by the Office of Dermatoses Investigations with the purpose of studying the processes involved and making recommendations looking toward the elimination of the hazards.

One plant engaged in the manufacture of glass wool for insulation and glass thread for the manufacture of textiles was inspected. Medical records of this factory, which employs 2,000 workers, show that among the workers reporting to the dispensary for treatment during a six-month period there were 25 cases diagnosed as industrial dermatitis. These were distributed in the various departments as follows:

| | No. cases | Employees |
|---|---|---|
| Continuous filament section | 12 | 65 |
| Research laboratory | 6 | 331 |
| Packing section | 2 | 160 |
| Battery mat section | 2 | 30 |
| Fabricating section | 1 | 75 |
| Personnel section | 1 | 24 |
| Bonded mat section | 1 | 80 |

In addition to these, inspection of the workers revealed other cases of dermatitis among those who had not reported to the dispensary for treatment.

### Industrial Process

THE basic chemicals are shipped to the plant in freight cars. Workers transfer the chemicals from the freight cars to mechanical conveyors which carry the materials to weighing chambers. The materials are automatically weighed, thoroughly mixed, and carried to the melting furnaces, or "tanks."

The interior of the freight cars, the floors, windows, walls, and machinery in the batch houses are covered by dusts of the basic chemicals. Employees in this section are exposed to the dusts of these chemicals,

*The ingredients used in the manufacture of fiberglass are those commonly employed in making high-grade glass, primarily silica sand, lime, soda ash, and borax.

some of which are skin irritants. Some develop pruritic erythema of the flexural regions and exposed parts during the warm months of the year. Others notice nosebleed on occasion, probably due to sodium carbonate dust or other alkalis which irritate the nasal mucosa.

Workers who experience irritations or wish to guard against them should wear clean work clothes daily and should take shower baths after work. They should be provided with individual pairs of rubber boots and leather gloves. Work shirts should be high-necked and heavy. They should wear impervious sleeves and aprons over their work clothes.[1] The men are required to wear respirators, and, when they are worn, an "invisible glove" type of cream should be applied to the face at the points of contact to protect it from irritation. The nasal septum should be protected by inserting petroleum jelly into the nostrils two or three times daily. Frequent cleaning and washing of the floors, windows, walls, and machinery will eliminate much of the dust.

In the furnaces the batches are converted into molten glass. Small inspection holes are open and the glare is quite marked. In routine inspection of the process, portable colored glass filters are used to avoid conjunctivitis, eyestrain, and glass-blowers' cataract. Since the workers often neglect using the hand filters, the inspection holes should be covered by colored filters.

Glass wool for air filtration, and thermal and sound insulation is manufactured similarly, but the binders and lubricants differ for the specified products.

The molten glass falls in fine streams through apertures in the forehearths of the furnaces. The molten glass is yanked into fibers by high pressure steam and the fibers drop onto a conveyor belt to form a layer of "wool." The formed wool layer is sprayed with the binder or lubricant; when binders are used the "wool" passes through an oven in which the binder is cured. The binder serves to hold the fine fibers together at the desired density. When a phenol formaldehyde resin binder is used, it is diluted with a pine product solvent. A lubricant is used on plain fibers to prevent breakage and to make the product more water-repellant. It consists of a mixture of petroleum oil and stearic acid. Because the phenol formaldehyde resins are spread in thin films over large surface areas on the glass wool filaments, they are completely cured in the curing and drying ovens.

The odor of formaldehyde could be detected in the area where the uncured resin binder is sprayed on the glass wool, but not on the wool as it emerged from the curing ovens. If men working in the area where the uncured resin binder is sprayed on the wool develop dermatitis, they should wear impervious clothing and use a mixture of lanolin and castor oil[2] as a protective ointment against the irritant formaldehyde fumes. To date, no cases of dermatitis have been reported in this department.

The binder used in glass wool for air filtration is a rubber compound and is apparently not irritating, as the men working in this section have not had any dermatitis. A tricresol phosphate (ortho form absent) is added to the glass wool as a dust adhesive. Employees exposed to the tricresol phosphate who show sensitivity should wear impervious sleeves, aprons, and rubber or leather gloves. No cases were found in this section.

The treated glass filter wool passes along the conveyor belt and is automatically compressed and cut into pads of the desired sizes and shapes. Employees load the pads on carts and transfer them to the shipping and packing departments.

In the manufacture of glass wool, glass slugs, which are small particles of imperfectly formed fibers, are produced. Seven to 18% of the weight of the glass wool may be unfiberized material. When glass wool is firmly handled, the slugs can be felt and can penetrate the skin. The employees working at the loading sections often have fissures, cuts, and scaling of their fingers, hands, and wrists. Some develop redness and itching due to irritation by the slugs. The majority do not seem to be troubled by handling the wool, and prefer not to wear gloves or protective clothing of any kind. All workers who experience irritation in handling glass wool should wear heavy, high-necked shirts, impervious sleeves, aprons, and leather gloves.

Glass fiber block for sound and high temperature insulation is processed by heat and treated with a suitable non-irritant chemical binder. Skin hazards in this section are those due to contact with the slugs. Workers who desire protection in handling this product should wear leather gloves, impervious sleeves, and aprons.

Glass wool for house insulation is processed with the phenol formaldehyde resin, the pine-product solvent, and the oil-stearic acid lubricant, and is automatically sealed in paper wrappers. The paper surface in contact with the glass wool on one side is automatically coated with a layer of hot asphalt which acts as a vapor barrier.

Fumes of asphalt could be detected in the vicinity of the ovens in which the asphalt was melted, probably because the ventilating hood of one tank was off while alterations were being made. Continued exposure to vapors of asphalt may lead to photosensitization and keratoplastic changes of the skin, and, while no cases of dermatitis have been reported among the men working in this area, nevertheless, workers who may be exposed to asphalt fumes should wear clean work clothes and underclothes daily and should take shower baths after work. They should also wear impervious sleeves and aprons. Protective ointments containing sun screens, used on the exposed parts, may prevent photosensitization.

Glass wool, for pipe insulation is covered with muslin or canvas made to adhere with a flame-retarding starch paste. Tar wrappers are used for underground heat insulation to shield the pipe covering against moisture. The potential skin hazards in this section are those due to exposure to slugs and due to asphalt vapors noticeable around the ovens. No dermatitis was found in this department. Recommendations as discussed above apply here.

### Manufacture of Glass Thread

THE special chemical mixtures required for glass textiles are melted and the glass is formed into small uniform marbles to facilitate inspection for improper mixing and dirt particles. Imperfections and particles of dirt in the glass, if allowed to remain, produce defects in the glass fibers. The employees in the glass melting and marble forming section wear coveralls, safety shoes, colored face and eye shields, and asbestos-covered gloves for protection against the furnace heat and glare and the hot glass marbles. After inspection the marbles are reheated in other sections of the plant, and the molten glass passed through small apertures in the bottom of the furnaces, from which it is drawn into fibers.

When fibers are in the form of continuous filaments, a specified number of them slope down and are coated with a layer of liquid binder (consisting of a mixture of starch, polyvinyl alcohol, and a substituted pyrazine) and are wound on drums. The filaments must be broken when the drums are changed. The hands of the workmen in this section are exposed to the liquid binder.

Of 65 men in this section, 12 reported for treat-

ment of dermatitis during the last six months. But prior to a recent change in the binder, they noted redness, itching, and acute eczematization of the hands and wrists and some noted spread of the eruption to other parts of the body. The eruption appeared from two to eight weeks after first contact with the binder. On questioning it was learned that almost all the men developed a skin eruption at one time or another but many of them did not report for treatment. Several of the employees noted that the eruption subsided within a few weeks despite continued contact with the binder. Dermatitis was more frequent during the warm months.

Seven employees with dermatitis were patch tested with the binder. At the end of 24 hours three of these men had positive reactions. Two control subjects never previously exposed to the binder had negative reactions at the end of 24 hours.

The history of onset after several weeks of exposure and the results of the patch tests indicate that the binder is a sensitizing agent rather than a primary irritant. The fact that some of the sensitized employees recovered from dermatitis while they were working shows that immunity may develop in sensitized workers if they continue to work, despite their dermatitis. A new binder is now used in this department. No cases of dermatitis have occurred in the two weeks that the new binder has been used.

If the new binder does not prove free of irritating effects, the employees in this section should wear impervious sleeves and aprons, high-necked shirts, and thin rubber gloves with the sleeves fastened over the gloves at the wrists. The men should wear clean work clothes daily and should take shower baths after work. An "invisible glove" type of ointment which is impervious to the binder should be used by the men who cannot or will not work with gloves or protective clothing. The preparation should contain a material that will adhere to the surface of the skin and protect it from contact with the binder. The ointment should be applied to the exposed surfaces of the body two or three times daily. New workers who become hypersensitive to the binder but who develop only mild reactions should be allowed to work for a period of three weeks in the hope that they will develop immunity or become hardened. If this does not occur, they should be removed from the job.

If new chemicals or binders are contemplated for future use, procedures as recommended by the Section of Dermatoses Investigations[3] should be carried out.

In retainer mat manufacture the glass fibers are formed by a jet of steam and are blown onto a metal conveyor belt. The layer of glass filaments is sprayed with a starch binder and passes through an oven in which the binder dries. The paper-like sheet of fibers is gathered in large rolls, which may be cut to specified lengths, and the rolls are loaded by hand onto carts. Since this process rarely produces slugs, there is no evident need of protective clothing.

In the formation of "stable fibers" for textile use, glass marbles are melted, drawn by steam or air, sprayed with a mineral oil binder and then passed through a gas flame before they are gathered on a revolving grooved metal drum. The fibers are drawn off the drum through a narrow-mouthed metal tube to form a sliver. This sliver is wound onto spools. The men working in this section are exposed to the vapors of the oil binder and the open gas flame. The binder appears to be non-irritating, since no dermatitis has been found in this department.

Glass textile manufacture is carried out in a manner identical with other textile industries.

The employees in the spinning, spooling, and weaving sections sometimes develop itching and redness of the neck and forearms due to exposure to the "fly," the fine filaments of glass which come off the thread as it is manipulated. Employees who experience annoyance should wear impervious sleeves and aprons.

The girls working at the tape machines have noted irritation of the nose and throat in addition to the itching and redness of the arms, neck, and face. Several of the older employees volunteered the information that the skin eruption and the irritation of the nose and throat have been more marked since the use of the recently abandoned mixture of starch, polyvinyl alcohol, and the substituted pyrazine as the binder in the continuous filament yarns. These employees should wear impervious sleeves and aprons, and they should insert petroleum jelly into their nostrils once or twice daily.

In the bonded mat section the girls cut large mats into the required sizes, dip the edges of the mats in a binder mixture to prevent fraying, and pack them for shipment. Some of these girls complain of itching of their arms and necks due to the "fly." They wear improvised aprons and use talcum powder as a protective on their necks and arms. These girls should wear impervious sleeves and aprons as well as the rubber gloves they now wear, and should use an "invisible glove" type of ointment instead of talcum powder.

The hazards to workmen using glass wool products for insulation and for other purposes are those due to abrasions by slugs in the glass wool. A few may develop allergic dermatitis from contact with improperly cured binders. If such workers wear leather gloves, impervious sleeves, and aprons, they will be afforded adequate protection against these hazards.

Workers handling glass fiber in textile manufacturing may develop dermatitis from the mechanical cutting action of the fibers on the skin, and a small percentage of them may develop an allergic dermatitis from the binder. Irritation of the arms, neck, chest, and other parts of the body may be prevented by wearing impervious sleeves and aprons. Irritation of the nasal mucosa may be prevented by inserting a bland grease into the nostrils two or three times a day.

According to an official of the company, the incidence of dermatitis in this plant was low, being in the order of 1% of the workers employed. No compensation cases have developed, indicating that the dermatitis is not severe. Some new employees experience sensitivity to handling the glass fibers for a few days and may wear gloves or protective clothing at first, but an immunity seems to develop quickly so that the great majority of experienced workers prefer to work without gloves or special clothing. Exceptions are found among employees handling hot equipment, coarse filter fibers, metal lath, and other collateral materials of like nature. In the principal wool and textile departments, workers, according to management experience, report greater discomfort from gloves and protective clothing than from the material with which they work.

Good practice requires that all workers be advised to follow the protective and preventive measures indicated in this report, according to the nature of their work. Those who prove sensitive to any of the binders, lubricants, or other materials they handle, should be required to follow the indicated protective measures.

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# Who Can Work?

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WHO CAN WORK? Certainly none will of the 500 unfortunate men and women who lost their lives, nor many of the seriously injured victims of the recent awful holocaust at Cocoanut Grove, a catastrophic horror, apparently due to a total and wanton disregard of the rudiments of safety and to that malignant complacency or contempt bred of familiarity. "It can't happen here," but it did. It happened with the suddenness of all accidents, the fury and awfulness of hellfire, the panic and suffering and death that beggar a charitable excuse.

Are there sufficient and adequate, easily accessible and plainly marked exits that work in your plant or your factory or work-place to allow quick evacuation? If you are plant safety men, don't fumble the ball.

Who can work? Certainly not the victim of a fatal occupational accident in your plant or other business place, nor immediately, or for months, perhaps, the victims of non-fatal disabling accidents at work, in the home, by motor vehicles, railroads and in public places.

Who can work? Certainly none in that great throng of upwards of 100,000 potential soldiers, sailors and marines and productive war workers accidentally killed last year in this country we so love to work for and to fight for and now to die for if need be. You know the data for last year: 40,000 killed in motor vehicle accidents, 31,500 killed by accidents in the homes, 18,000 killed by accidents at work, 15,000 killed in public places and only 2340 at Pearl Harbor. None of these can work, nor any one of the 100,000 or more persons killed the year before last and the year before that.

It is specious only to say, or to put in writing, that most of the 34% increase in accidental deaths over the last two decades from 76,000 to 102,500 came from an increase in population. That is being smug. In the same two decades and in the same increasing population, the death rate from tuberculosis dropped down 61%, from typhoid fever 94%, and from diphtheria 94%; from accidents it went up 11%. In 1941, Metropolitan Life Insurance Company reported for its millions of industrial policyholders the lowest death rate that had ever been attained. It was similar for the country as a whole. It could have been an even lower rate if, over the years, advances in safety and accident prevention had kept apace the progress in medical accomplishments.

Who can work? Some may, sometime, and in some way, again work of the more than 9,000,000 persons accidentally injured up and down the country last year and every year. And as our social concepts broaden out toward the goal of equality of opportunity for all —for the handicapped as well as the rest of us—some of the hundreds of thousands of persons now regarded as permanently disabled by the yearly toll of accidents will find their opportunity for economic independence, their rightful place in society, their right to attain happiness by faithful performance in this democracy of which we like to boast.

With what I have said you are all thoroughly familiar. I have said it, however, hoping by repetition to impress upon this safety-minded group of persons that in the hour of our country's greatest need for manpower to preserve our way of life, hundreds of thousands of priceless productive lives are being sabotaged by needless accidents, that over 400 million mandays of productive effort have been lost from the war effort this year, that our ideas and our hopes and aims toward accident prevention have failed miserably, that accident prevention is hopelessly trailing far behind the prevention of disease and the achievements of medicine in the saving of human life.

In a recent address at Pittsburgh, War Manpower Commissioner McNutt said, "The contractor who thinks he can beat the timetable and top the quota by ignoring health and safety requirements is due for a shock. Before long he will not be able to replace every sick or injured worker. Army and Navy 'E' pennants won at the expense of high accident rates will have to be lowered to half-mast." Perhaps many of us who have lived with the accident problem for years and may have become complacent or discouraged about it, needed the shock of Cocoanut Grove.

Who can work to satisfy the great yawning maw of the war god now stalking the world. Who can work to bring victory under God, Christ the King, to the United Nations? This country of ours has become the most gigantic factory the world has ever seen, producing, at first in a trickle only, now in a mighty stream, and next year in a deluge, ships, planes, tanks and guns roaring down the assembly lines. True, the war finally must be won on the battlefields, but it cannot be won without production, and it can be lost in the shops and factories.

Our country has the manpower to win this war, if it is kept vital. To keep it vital is our business; to allocate it properly is a problem for somebody else.

We know that when the 1943 requirements of the armed forces for nine million men shall have been satisfied, there will remain only about 34 million able-bodied men in this country. These are not nearly enough men to provide for war industry, civil industry, agriculture, the professions, trade and domestic service. Adding to them the 15 million women now employed, there will still remain a deficit of about seven million persons in the present pool of workers and a larger deficit to meet the 1943 requirements of expanding war production.

The spirit with which our people adapt themselves to changing circumstances will solve this manpower problem also, and by such measures as these probably:

1. The voluntary transfer of hundreds of thousands of men and women into the war industries from civil employment for gain, for glamour, by patriotic impulse, or through necessity dictated by the folding up of civil business and trade.

2. A tremendous increase in the number of women employed, especially in war industries, and to fill vacancies in civil industry and agriculture, to the end that women will comprise about one-half of all workers in war industries, two-thirds in all civil industries. And most of them will be women from the homes and schools without previous industrial experience.

3. The employment of boys and girls 16 years or more of age for part-time or full-time work.

4. Increasing the weekly hours of work beyond the present average of 42 hours.

5. By the reassignment, officially, if necessary, of that immense horde of able-bodied young men from their civil service and other desk and white-collar jobs into the armed forces where they rightfully belong, or into essential industries, replacing them with women, older men, and capable handicapped persons.

7. A more human concept by employers, personnel and employment managers, and insurance companies toward the employment of physically handicapped persons.

Presented at the Engineering Section, Massachusetts Safety Council, Boston, December 3, 1942.

Obviously, every one of these proposals increases the hazards for occupational accidents and disease, but that very fact should incite us to a better performance than the record now bespeaks for us.

WHO CAN WORK? Some will answer that everyone can who has the will to work. That is not exactly true. Some very willing persons, even some now at work, are too chronically ill to work.

We should be particularly interested in that large group of physically handicapped persons who are perfectly able to work if properly placed at work, who are vocationally suitable, who have the will to work but who have been denied equality of opportunity because we have evaluated their disabilities and neglected their capabilities.

When we think about who can work in essential war industries, our thinking pictures huge factories turning out 125,000 planes, one every four minutes next year, 75,000 tanks, 800 ships, 30,000 anti-aircraft guns, all requiring great physical effort. That is not the whole picture. We are less conscious of the fact that the armed forces require a lot of other things and materials. When the Army places a single contract for nine million barrack bags; 10 million neckties; 18 million undershirts, and 78 million pairs of socks, it provides unlimited opportunities for work for the physically handicapped and for older men and women.

Data compiled by the National Institute of Health indicate that there are about 23½ million persons in this country, outside of institutions, of all ages, who have some chronic disease or physical handicap. Of these, some 16 million persons are potential candidates for work or for rehabilitation for work in war industries, and constitute a great reservoir of persons who can work for victory, persons who want to work for victory.

Of these 16 million men and women, less than half a million are completely unemployable. The others present varying degrees of employability.

About 50,000 are blind in both eyes, but some men and women who are totally blind can be employed. Henry Ford, General Motors and numerous other corporations and employers able suitably to place blind persons have employed them for a long while with mutual satisfaction. Two hundred and fifty thousand are blind in one eye. One blind eye is entirely compatible with many types of employment, except in the clouded mental vision of some employment managers.

About 50,000 are totally deaf persons, but frequently that is an asset rather than a liability. Three-quarters of a million are partially deaf, but given a fair opportunity they can be nonetheless efficient workers than one who grows deaf at work. (We have young women at work as telephone operators who are very deaf but who carry on very efficiently by substituting the Western Electric artificial hearing aid for the usual telephone receiver.)

Nearly two million persons are handicapped by orthopedic impairments, and a large number of these are due to accidents largely preventable. An analysis of 14,460 different job operations disclosed that 23% of them could be satisfactorily performed by persons without a left hand or forearm, 19% by persons who had lost the whole left arm, and 17% by persons having no right arm at all. It disclosed that these jobs could be filled by 64% of persons presenting a mutilated left hand, by 62% with a mutilated right hand. Sixty per cent of all jobs could be carried on satisfactorily by persons with some form of heart disease.

I caused wonder in the early days of pre-employment examinations when I accepted a one-legged man for work as a stationary fireman. He has worked for about 20 years and he has not been injured at work in any way at any time. Some time ago we accepted for drafting a young woman born with a thumb but no fingers on her left hand, only a thumb and a rudimentary index finger on her right hand. She can thread a fine needle.

In recent years I have been privileged to supply 97 persons with an artificial larynx when surgery for cancer of the throat made it necessary to remove the larynx or voice box containing the vocal cords. Thereafter they have no natural voice. About 10 years ago the Bell Telephone Laboratories developed a little instrument, the artificial larynx, and with this instrument these persons can talk; they do talk, some of them extremely well. With it all of them can work, most of them did work again, some are still working.

One might wander on indefinitely counting off the great numbers of handicapped men and women who are working efficiently and successfully, and counting off again the great number who can work if given the opportunity, proper placement, and decent consideration.

It has been established by careful study that physically handicapped persons, properly placed, do not increase the accident risk. One such study, in fact, revealed an accident experience 5.6% less for the handicapped than that among an equal number of so-called normal persons doing exactly the same work. In 1937 in Pennsylvania only 175, or 0.6%, of 29,000 handicapped drivers of automobiles in that year were involved in accidents, while 91,000, or 4.5%, of the other two million drivers met with accidents.

Employers must be willing to give these persons the right to work, industrial physicians must search for their abilities, record their disabilities and recommend them for proper placement, and insurance carriers must remove the barriers. There must be no waivers. Safety men will not be bothered by them.

Not all the blind are so gifted as was Milton, nor the deaf as versatile as Edison. Not all the cripples possess the genius of Steinmetz or the brilliance and stamina of Franklin D. Roosevelt. But, like all of these, many of our handicapped countrymen can work. They ask only for an equal opportunity to help speed the day when the forces of brutality, the arch-enemies of civilization who in cold blood would murder such as they, will be crushed forever.

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## Rehabilitation

*—Recent Developments in Connecticut—*

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THERE is much being written and talked these days about the manpower situation. It is perhaps to be regretted that the larger part comes from well intentioned government agencies dealing very comprehensively with statistics and producing plans as varied as the bureaus they represent. All point to government control as the only solution. Organized medicine appears in too many instances to be accepting this solution, while its rank and file are either too busy to think about or will not see how the rehabilitation factor in this problem may affect both their status and their daily bread. There is too little heard from the industrial doctors who are more or less conversant with this problem, who have to live with it and work out their own solutions.

Many employers, 100% in war work, facing a rising production schedule, find less employees on their payroll each month, or just manage to keep even. In one recent month in Connecticut, reports to the Manufacturer's Association of Hartford County by over 80 firms showed a net gain of 153 in employment and all but three were gained by one company.

Industry is being scolded, told to lower its employment standards, and to take handicapped workers. Someone, rather late as usual, is waking up to the situation that we in this field have known about for over a year. We have individually attacked this problem and have arrived at some practical solutions which help, but still fall far short of necessary attainment.

About a year ago the trend began to show in the number of waivers taken in the pre-employment examinations, rising month after month, from 8 to 10%, up to over 50%, dropping on the employment of women and fast rising as we again strain the dregs. Rejections paralleled waivers. Standard requisites for employment were lowered again and again—handicapped workers were fitted to jobs. At Colt's we have over 50 deaf and rather unintelligible-talking employees; over 30 with one arm, about the same number with one leg; over 200 with rheumatic hearts, of which 120 are placed by a cardiologist in Groups 2 and 3; many with useful vision in only one eye, and other conditions too numerous to mention. In three months we took waivers on 554 cases of varicose veins and rejected 250. All my industrial friends were making the same endeavors and were absorbing handicapped workers in about the same proportion as to numbers employed.

We have had in Connecticut since 1920 a Vocational Rehabilitation Service, which supplemented workmen's compensation and had for its object the training of injured employees and fitting them again for industry, and in supplying artificial appliances and training in their use.

Somewhat over a year ago clinics were established in conjunction with the State Medical Society, the Manufacturer's Association of Connecticut, and the departments of psychology at Yale and Trinity. Handicapped individuals were evaluated and were presented before groups of manufacturer's or their representatives. This was not a true rehabilitation program, but more for re-education and job placement, depending upon interested charitably inclined employers. With the shortage of labor most of this group were placed. This plan received much favorable comment, accomplished much good and found employment for a considerable number of handicapped individuals.

ONE day last September I received a call from the employment office and found that on that day they had 150 requisitions, that 54 had applied for work and my examiners had turned down 24 and had taken waivers on most of the remainder. On investigation I found that 10 had been rightly rejected for machine jobs because of varicose veins. I arranged time to examine all questionable rejections and found that varicose veins was second in causes for rejection, being just below cardiovascular disease and above eyes. A considerable proportion of these could be salvaged by the simple operation of ligation and injection of the saphenous vein.

The problem was how was this to be accomplished. It was not entirely the manufacturer's responsibility nor the state's, as these people came from all over the country. Too many were already depending on the U. S. government, but it was partly its problem. After unsuccessful attempts to interest various groups in this venture, I finally called Mr. Edward Chester, Director of Vocational Rehabilitation at the State Board of Education, and stated the trouble to him. He said, "I'll be right down—I don't know where I'll find the money, but we will do it." When you find the right man in the right place things happen. In 15 minutes we worked out a trial method. The next day I sent up two cases to his office and the following day they were operated on at the Hartford hospital.

It was on Thursday, October 22, 1942, that we started this venture. We were to have a meeting the following Wednesday with Major R. B. Williams, Senior Surgeon and Director for District No. 1 of the U. S. Public Health Service, to talk over securing some funds to help care for our out-of-state liabilities. Monday we began to see the far reaching ramifications of our act on industrial medicine, organized medicine, hospitals, manufacturers, compensation, and labor. We used the telephone and in two days a meeting, attended by 50 representatives of these various organizations, was held in the Colt auditorium. They were informed as to our undertaking, shown its need, and invited to express their opinions as to how they could cooperate with us. Because each group saw that this venture vitally affected them, there was 100% cooperation and action.

Mr. Chester, as Director of Rehabilitation in the state, was authorized to serve as chairman of a committee to manage this "infant" and to appoint a small advisory committee, each member of which was to be chairman of a group representing his special interest.

Dr. Creighton Barker, Executive Secretary of the Connecticut State Medical Societies, was appointed to a Committee on Medical Policies and Methods.

Dr. James H. Biram, Medical Director of Colt's Patent Fire Arms Manufacturing Co., was to represent industrial medicine.

Mr. William B. Sweeney, Executive Secretary of the Connecticut State Hospital Association, served for the hospitals.

Employers were represented by Mr. W. Adam Johnson, Secretary of the Manufacturer's Association of Connecticut.

Mr. Leo J. Noonan, Chairman of the Board of Workmen's Compensation Commissioners, represented workmen's compensation.

Labor was represented by Mr. John C. Ready, Deputy Commissioner of the State Department of Labor.

It was decided that each committee was to meet the following Wednesday morning at the Hartford Club and have a definite proposition ready so the chairmen could meet that same afternoon to plan for carrying out the program. This was done, and the Connecticut Wartime Manpower Rehabilitation Committee started to function in its advisory capacity to the Rehabilitation Division of the State Department of Education.

At this meeting it was determined:

A. That at present only defects in the pre-employment group that needed relatively short treatment or evaluation should be attempted. As a guide, the following conditions were named:

1. Cardiovascular disease.
2. Varicose veins.
3. Hernia.
4. Vision.
5. Minor orthopedic defects.
6. Diabetes.
7. Miscellaneous.

B. That candidates for rehabilitation were to come from:

1. Plant physicians.
2. Rehabilitation offices set up in the different industrial centers of the state. In this case, plant physicians

or a group of consultants would determine the advisability of making a correction of the disability.

C. That a state-wide panel of doctors be set up to secure competent men to carry out the necessary procedures. That names for consideration on this panel were to be submitted by:

1. Plant medical directors.
2. Medical directors of the insurance companies.
3. Hospitals.
4. Specialists.

Workmen's compensation rates should govern the fees paid to doctors for services rendered.

D. That hospital rates were to be their lowest semi-private charges.

E. That the client should have the choice of hospital and panel doctor.

F. That medical and hospital bills be paid by the Rehabilitation Division of the State Department of Education, and that the individual make repayment to them on an installment basis. Also, that inability to pay would not disbar anyone.

Expenses were to be met by a revolving fund, furnished one-half by the State of Connecticut and one-half by the United States.

This program was at once put in effect in Hartford county on an experimental basis and, after a month's trial, during which time a panel of doctors and hospitals was set up, it was established on a state-wide basis. At the time this paper was written too short a period had elapsed to speak of accomplishment.

Colt's has had over 30 cases of varicose veins operated on through this method, and have 25 or more from this number at work now in our plant. We expected about 25% of the recommended cases to avail themselves of the opportunity offered, but to our surprise, about 80% responded. To my greater surprise, each and every one has personally thanked me and expressed gratitude for this help. Mr. Chester reports that installment payments are being met promptly, and that he has had the same response of gratitude that I have.

It will be interesting and instructive to see how this works out now that it is on a state-wide basis, but I am sure that the same enthusiastic response to the need that started this work will carry it on.

We in Connecticut believe in state rights. We will welcome all governmental advice and help that is offered, but we believe that with the earnest and hearty cooperation of the state agencies, the medical societies and hospitals, and with the backing of the manufacturers, the compensation commissioners, and labor, we can take care of our rehabilitation problem without regimentation.

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## The Mental Health of Workers

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UNLESS one has had experience in dealing with persons affected by nervous and mental disorders he is apt to have an incomplete and often distorted conception of the vast social, economic and industrial problem which these patients offer for solution. Persons ill enough to be in a hospital or asylum for mental cases do not, of course, concern us in industry, but the much larger number of people with mild or early cases of this nature are an industrial problem of major importance. Furthermore, no one with experience in dealing with large numbers of employees will deny the great significance of the so-called psychologic factors among workers whom everyone regards as mentally normal.

It is a compelling fact that there are actually more hospital beds in the United States that are occupied by patients with nervous or mental diseases than by patients with all other kinds of diseases combined. And we should keep in mind that for every neuropsychiatric case actually occupying a bed there are probably several who are not in a hospital. In this vast army of persons who are usually not ill enough ever to reach an institution for the insane, we find our employees. It is not intended to imply that a large portion of industrial workers are insane, but that mild nervous disorders or the early stages of serious ones occur far more often than is generally realized. The obviously insane person can be detected by any intelligent layman but it is the duty of the industrial physician and nurse to detect that person before he causes serious accidents or spoilage at work and, if possible, to prevent his entering a position of danger. To the borderline mental cases, to persons with mild nervous disorders, to the emotionally unstable, to the person with limited intelligence, and to others that we may label as misfits in industry, we can attribute an impressive share of accidents, frequent layoffs, errors, spoilage, slowed production, and damage to that precious ingredient of our war effort which we call morale.

As the war progresses industry will be saddled to an increasing extent with the mental or, if you will, the psychologic misfits in our population for the simple reason that they are being rejected by the armed forces. At the present time it is generally recognized that such men are far more trouble in the military services than they are worth, and they are excluded for the same reasons that would cause difficulty in industry. As a matter of fact, many of these persons show a history of being unable to give satisfactory service on a job for an appreciable length of time. They commit errors, are not dependable, do not adapt to conditions of work, show a high rate of absences of short duration from their work, and impair the working morale of their fellow employees by their poor example, bickering and complaining. The armed services now find it wiser simply to reject these men than to correct their peculiarities or adjust to their shortcomings.

On account of labor shortages, however, industry will have to cope with the shortcomings of these mentally unstable men whether it wishes to or not. We shouldn't leap to the conclusion that these men are entirely useless to industry, as they are at the present time to the military services. In the proper environment, with suitable attention to what they can and cannot do, and with an understanding of their infirmities, valuable work can be obtained and is being obtained from these persons. Today those who are concerned with maximum production at the factory may profitably turn their attention to such psychologic problem cases and try to understand them.

FOR the purposes of this paper the employees who present nervous or mental problems in industry can be divided into three basic groups.

First, there are those persons whom everyone considers normal up to the certain point in time when they begin to show signs of mental abnormality. These workers are similar to those persons who develop disease in other parts of the body. They are healthy, work well, and behave normally until mental illness

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The opinions or assertions contained in this article are the private ones of the writer and are not to be construed as official or reflecting the views of the Navy Department or the naval service at large.

strikes them. The severity of the illness can vary, of course, from being barely noticeable, like a slowly developing mild deafness, to being so severe as to incapacitate the victim completely, as a paralytic stroke will do.

In the second group, which is a much more numerous one than the first, we may place workers who have always been and always will be considered different from the average person so far as their mental behavior is concerned. They are like employees who are unusually tall or have peculiarly shaped features. In other words, from birth or early childhood the mental make-up of these persons is different from what is generally considered normal. From the discussion to follow it will be apparent that industry must learn to appraise the defects in these people, to correct them when possible, and to place these workers in positions where their defects are not costly to production.

The third and largest group consists of persons we call normal. Among them there are problems of a mental or psychologic nature which appear from time to time, and which industry finds are often as important as the problems of buying and selling their commodities.

EMPLOYEES in the first group just described are obviously medical problems and can best be handled by physicians who understand diseases of the nervous system. Like diseases of other organs in the body, the diseases of the nervous system present many problems insoluble to the physician as well as problems with which medical science can cope fairly adequately. The causes of some of these illnesses are well understood; general paresis, for example, being clearly due to the organism that causes syphilis. Other illnesses in this group have causes which are as poorly understood today as is the cause of cancer. As a rule a patient with a disorder of the nervous system comes to the attention of an industrial physician or nurse, or to the attention of his private physician, relatively early in the course of his illness. This is true because his sickness has caused him some distress for which he seeks relief, or because people around him, at home or at work, notice that he is not well and urge him to seek medical attention. The early detection and proper treatment of such cases is almost as great a responsibility of industrial medicine as the detection and treatment of tuberculosis.

To describe all the disorders of the nervous system which fall within the first group would mean to write a textbook of psychiatry and neurology. For the purpose of illustration perhaps a brief description of one common nervous disorder will suffice.

The depressed phase of manic depressive psychosis, an illness which is commonly known as melancholia, is frequently a disorder with which industrial physicians will have to cope. The cause of this illness is not known, and its appearance in a worker cannot be attributed to the living conditions in which he finds himself. Up to the time this sickness begins the patient is very apt to be a valuable employee, because quite often this disorder will affect those persons who have been particularly conscientious, intelligent, industrious and of excellent character. For no known reason this employee (men or women are affected with about equal frequency) begins to show many symptoms which impair his efficiency and which are responsible for many absences from his work. The patient begins to fatigue very easily. He loses his previous keen interest in his job, in his friends, and even in his family. Severe insomnia appears, especially the variety in which the patient is unable to sleep in the early morning hours. The appetite falls off considerably, and with this there may be a marked loss in weight. The patient becomes apprehensive and worries excessively about many things of little or no consequence. He develops many fears which are often absurd in the light of the facts, but which are, nevertheless, real to the patient and extremely disturbing. For example, he can be obsessed with the idea that he is about to lose his job or that he is going insane, despite the fact that everyone with a right to an opinion assures him that this is not true. A very common complaint of these patients is that they cannot concentrate on their work, and that they find it difficult to keep up with. They slow down in their rate of work and make many errors. A patient with this illness becomes depressed or sad for no apparent reason; he will weep on little or no provocation; his feelings are hurt much more easily than usual; he becomes irritated and impatient much more quickly than in his normal condition. To complete their misery, these patients develop numerous and severe aches and pain in any or all parts of their body. Headache, palpitation, dizzy spells, indigestion, numbness in the arms or legs, pain in the heart and choking sensations in the throat can all occur in this illness and be most distressing. On the other hand, this illness never leads to insanity as the average man uses this term. The memory, judgment, reasoning ability and understanding of these patients suffer little or no impairment as a result of this illness. When it is over the patient can usually resume his old job with the same skill and reliability that was present before the onset of the illness. The disorder has its ups and downs. For no apparent reason it comes, for no apparent reason it gets better or worse for a few days or weeks, and for no apparent reason it will disappear. The doctor's problem is to recognize this illness, to differentiate it from many others which it may resemble, and, finally, to offer therapeutic aid, which is frequently very helpful.

There are of course, dozens of illnesses in this group, some of which resemble the example very closely and others of which do not resemble it at all. Some nervous disorders disable a patient completely and permanently as well as quickly, whereas with others a long and useful industrial life is possible if the case is properly handled. Just as in the case of tuberculosis or syphilis, the problem in these cases is to recognize them early and to treat them correctly. That is primarily the responsibility of industrial physicians and nurses, but in a lesser degree of the community and employer as well.

THE last group of workers left to discuss are the normal ones. Again, the psychologic or mental factors which determine the working performance of the normal man or woman constitute a complicated situation. To begin with we should recognize that the productivity of a worker depends on a triangle of forces. First, what kind of man or woman are we dealing with? Is he smart or stupid, is he energetic or indolent, is he ambitious or contented, is he meticulous or careless, etc. How these character traits came to be is a theoretical problem which does not concern the plant manager when John Jones walks in for a job, because the man is already there in his molded state. But the kind of work he can entrust to John Jones does depend on these traits for obvious reasons. The second force in the triangle is the set of conditions to which the employee is exposed away from the plant, at home or play, influences acting upon him through his wife, children, friends, recreation, diet, state of health, financial status, and many other factors. Progressive employers would willingly pay good money to insure

adequate sleep, proper recreation, adequate diet, freedom from worries and freedom from illness in their employees because they are learning that these things are as important to accident-free high performance on the job as safety catches or clean washrooms at the place of work.

It is slowly becoming apparent that ignoring these factors in a large industrial establishment can cost as much as ignoring the quality of raw materials going into the manufactured product.

In this connection it may be well to digress for a few moments to discuss the value of education among employees as a means of controlling important off-the-job factors, if we may speak of them as such. Education—propaganda or advertising, depending on the point of view—is no doubt one of man's most potent weapons for getting other people to do as some people want them to. In some quarters, however, the value of education among industrial employees is looked upon as either useless or hopeless. Their belief is that the intelligence of the average laborer is not such as to interest him or to enable him to understand ideas that will help to increase his efficiency at work. They contend that employees are suspicious of employer-sponsored education. The effect of an educational program is said to be that of a "shot in the arm," brief and temporary. All in all they maintain that an educational program for employees is not worth the expenditure of time and money that is entailed. An eloquent rebuttal to these points is the mere fact that all employee groups, without exception, own or aspire to own radios, indulge in well known brands of cigarettes, smoking or chewing tobacco, and today are buying war bonds. Advertising does it, most of us will agree—but what else is advertising but education of a potent nature? It is potent, because it implants ideas by a simple, attractive, and, most important of all, continuous technique. Motives of self satisfaction are appealed to adroitly but effectively. It seems that effective education among employees must borrow the techniques of advertising. We must tax our ingenuity to sell ideas and attitudes to employees by making them attractive, interesting and understandable to the particular group concerned. The program must appeal to the self interest of the employees and it cannot be successful unless it is a continuous and coordinated effort. A continuous and well coordinated program of hygienic and safety education skillfully assembled can go a long way toward assuring better physical and mental health among employees, more adequate rest and less harmful recreation, more consciousness and pride in safe practices both at work and away from work, and more interest in doing a certain job well. The writer is convinced of the truth of this statement from reports gathered over a year in many industries where such programs are now in force. The program, however, must be continuous and coordinated, not sporadic and ill conceived, and it must above all be genuinely directed toward the welfare of the employee.

Returning to the third angle of forces upon which worker performance depends, we come to the conditions to which he is exposed at his place of work. By these is meant a complex web of all the things and persons he comes in contact with, such as his fellow workers, his superiors, his equipment and materials, his salary and opportunity for improvement, his security of tenure on the job, the interest shown in his initiative or efforts, the cleanliness of the work place, the temperature and humidity of the work room, the lighting equipment, and dozens of other things, some of which have received far more stress than they deserve and others far too little. The extent to which each of these factors can be altered or the effect such alteration will have in a specific place of employment varies a great deal and is an individual problem for the management.

Any program intended to boost the amount or quality of service rendered by employees or even to decrease accidents and errors cannot afford to ignore any of the aspects or angles mentioned in the triangle of forces above. Most can be accomplished in the way of correction by attacking the last two angles, conditions away from work and those at work, and both are equally important. The importance of the second angle, the away-from-the-job factors, is gradually being appreciated by many employers. It is to their advantage, they are finding, to look into the dietary and personal problems and recreational habits of their employees because it means dollars and cents to their business. To put it in another way, progressive business is concluding that what is good for its employees both inside and outside of the factory is also good for itself.

The mental health of workers, we may summarize, offers many interesting problems the ramifications of which are very wide. An understanding of these problems and attempts to solve them mean rewards in the form of more efficient industrial production, with less accidents and waste, from happier and healthier employees. Common sense as well as professional skill are needed. Fancy theories and confusing explanations will retard the application of sound knowledge in industrial psychiatry. General principles have been stressed here rather than concrete solutions for specific problems, because the topic is too large for such detailed treatment and conditions vary from plant to plant and industry to industry. If the present discussion has stimulated a desire to understand these problems more fully and has shed some light in what is yet a dark corner of industrial medicine—if it has done these, its purpose is amply rewarded.

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## Health Hazards in Welding

*—A Review—*

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BOTH oxy-acetylene and electric arc weldings have been used in industry for more than 30 years. The cases of poisoning due to welding are not discouragingly frequent, although the sources of potential hazards are numerous and very much interwoven.

Before discussing these hazards to which welders are exposed, I should like to describe briefly the procedures of welding used in industry.

Welding is used for constructive or destructive purposes. For metals ⅛-inch or less in thickness oxy-acetylene welding is used. Electric arc welding is preferably applied for thicker metal rods. Sometimes two forms of welding are complementary, for example, the use of oxy-acetylene welding to cut metals before arc welding is done.

The basic principles of these two forms of welding are a little different. In oxy-acetylene welding, acetylene burns in the presence of $O_2$ as shown in the following equation:

$$2C_2H_2 + 5O_2 = 2H_2O + 4CO_2$$

In electric arc welding the procedure is more complicated than in the former because several modified forms are applied for different purposes. Thus electric welding may be classified as carbon arc welding, metallic arc welding, atomic hydrogen welding, resistance spot welding and seam welding, etc.

But the basic principles are nearly the same, namely, an electric generator assures a continuous current under low tension (low voltage), and a base metal, which is to be welded, forms one of the two electrodes. The other electrode is frequently a metal rod containing the same ingredients as the base metal. This second electrode may be a carbon rod. In that case an additional metal rod must be used.

It is customary in electric welding to use coated electrodes The purpose of coating is to form a slag which protects the molten metal from contact with air, to maintain steady arc and to prevent the oxidation of molten metal. The ingredients of coatings are mostly silicon dioxide ($Si O_2$) in the form of free or combined silica.

At high temperatures these substances react with metallic oxides to form a slag or dross of metals. Thus they have both cleaning and protective action.

The metals used as bases, in other words the metals to be welded, are often iron, most frequently steel, and rarely, copper, zinc or any of the different alloys. But mostly iron and steel are used for welding.

An iron or steel rod may contain some other substances in small quantities. The following analysis may give an idea:

| | |
|---|---|
| Silicon | 0.8% |
| Chromium | 0.6% |
| Molybdenum | 0.25% |
| Manganese | 1.50% |
| Copper | 0.5% |
| Iron | 96.4% |

As to the electrodes; there are numerous electrode samples slightly different from each other. As an example, an analysis of one of the sample electrodes is given below; this is usually a coated one:

| | |
|---|---|
| Silicon dioxide | 28.10% |
| Iron oxide | 20.84% |
| Alumina | 10.79% |
| Lime | 7.59% |
| Magnesium | 2.90% |
| Arsenic | 0.0005% |
| Manganese oxide | 25.12% |
| Loss on ignition | 4.60% |

WHAT are the health hazards in arc welding?

Now, it is quite easy to estimate the types of health hazards in welding after a review of the running procedures and the ingredient substances of metals used in welding.

As is obvious from such a review, the sources of hazards to which welders are exposed are very different.

They may be classified as gases; fumes or vapors; dusts; smokes; radiation, and ionization.

Some of these sources are produced from the oxidation of nitrogen in the air, and some are the result of the oxidation of simple metals in electrodes or emanation and ionization of metals at high temperatures. To these the hazards of $O_2$ deficiency, burns and other injuries may be added to complete the list.

Among the gases, nitrogen oxides: $N_2O$, NO, $N_2O_3$, $NO_2$, $N_2O_5$, which all are briefly called nitrogen gases or fumes, are most important. The first $N_2O$, nitrous oxide, is harmless and even was used in the past in surgery as an anesthetic. Since the odors of these gases are not very strong they may be inhaled in dangerous amounts without the welder being aware of their existence.

Generally these gases are irritant (insoluble irritants) to air passages. The symptoms of irritation are manifested as a feeling of constriction of the larynx, spasmodic cough, oppression in the chest, anxiety, cold perspiration on the face, protusion of the eyes, coldness of the extremities, difficult speech, etc. Consciousness is at first unimpaired but, with increasing difficulty of breathing, it becomes dimmed. The urine is scanty, brown in color, containing hemoglobin and albumen. Death may result from edema of the lungs. These symptoms are especially due to inhalation of large quantities. Inhalation of very moderate quantities for a long time produces a chronic bronchial catarrh and pallor. Nevertheless the effects of nitrous gases vary considerably according to the susceptibility of the welders. Persons who suffer from respiratory diseases are especially susceptible. Sometimes in a normal individual, inhalation of small quantities for many years does not noticeably affect the health of welders.

The other gases formed around the electric arc are: CO, which is a chemical asphyxiant and is not very important here; and $O_3$, ozone, which is an insoluble irritant gas. Effects of these gases do not differ from those of the groups to which they belong. But their concentrations are not so high as to be injurious. Only CO concentration due to $O_2$ deficiency may be important, especially in acetylene welding, which is to be mentioned later.

The second group of exposures of arc welders are metal fumes, vapors and smokes in various quantities. The amounts and kinds of these substances also vary according to the nature of the base metal and electrodes used in process. Chiefly they are silicon, titanium, manganese, zinc, iron, copper, chromium, molybdenum, calcium, aluminum and magnesium oxides in different concentrations.

But the principal metal fume depends upon the molten metal, which is often iron, and naturally the principal metal fume is iron oxide.

In many instances the steel being welded is painted, and coated with other metals. These substances are volatile and form metal fumes, or smokes. Mineral oils when heated in contact with air produce organic acids, aldehydes, and a small amount of oil can produce a great amount of smoke. The steel also may contain 2% of lead, which is added intentionally in recent years to impose machinability. Moreover, the lead fume or dust may be produced by welding the steel sheets with a thin coating of an alloy containing a large proportion of lead.

THE effects of these various metal fumes and vapors upon the health of welders have been frequently studied by several investigators, as Philip Drinker, Sayers, Lehmann, etc. Also one of these interesting studies is made by De Laet and Wosen in Brussels on 14 workers of long experience and on others having short experience in this work.

The symptoms found during these observations are summarized as follows:

1. A constant polycythemia vera, probably due to toxic action of arsenic and manganese.

2. Constant and continuous gastro-intestinal troubles, due to toxic action of various gases and fumes upon liver function, or due to gastric hyper-secretion provoked by hyperemia, or due to reduction of antitoxic effect of liver.

In addition to these symptoms, metal fume fever must be mentioned, although it is not recorded in the above study.

Metal fume fever, or brass founders' ague (brass chills, zinc chills, etc.) occurs most frequently in exposure to zinc vapors. According to Philip Drinker, only zinc oxide fumes are responsible for this fever. However, copper, silver, iron, cobalt, antimony, cadmi-

um, magnesium, are also condemned by some other authors.

The symptoms are too well known to repeat here. The cause is probably the breakdown of pulmonary epithelial cells by metal fumes and resorption of toxic products through the respiratory canal.

Metal fume fever due to inhalation of various metallic vapors is common among welders. Metal fumes, besides their fever producing actions, have also irritant action as nitrogen gases. Westhofer showed a high incidence of upper respiratory infections due to irritation by metal fumes.

This action, however, is not as important as that of nitrogen gases.

A third group of hazards is artificial ionization to which welders are exposed inevitably. According to American, Russian and German authors' investigations, made in the confined atmosphere of working places, these artificial ionizations are responsible for the manifestation of various subjective symptoms which were observed among workers studied in Brussels.

Researches by the Central Ionization Laboratory, of Moscow, showed too high ionization around an electric arc. While there were 50-800 positive or negative small ions in 1 cc. of normal air, there were found 13,667,111,666 ions in 1 cc. of air at about one meter distant from the arc, and it was fixed that the quantity of ions varies according to the nature of the job.

Also the study of the Harvard School of Public Health (Yaglou and others) proved that such high concentrations of ions have an effect upon metabolism, blood pressure, pulse rate and respiration, and consequently were responsible for many physiological changes and some subjective symptoms which vary also according to susceptibility of welders and the amount of ions in the air where they work.

These subjective symptoms due to excessive ionizations are a sensation of cooling, chills, stimulation; or, on the contrary, relaxation, tendency to sleep, a sensation of hunger, dryness in the nose, and a sensation of irritation, headache, nervous irritability, frequent voiding of urine—pollakiuria.

Another source of hazard in welding is radiation, although this is not very important. It may cause some subjective eye troubles, such as rapid fatigability while reading, sensation of heat, burning, photophobia, and sometimes a tendency to sleep immediately after the work.

HEALTH hazards in oxy-acetylene welding are practically the same as in arc welding. Symptoms due to inhalation of nitrous gases, metal fumes, dusts, ionization and radiation are more or less common in both types of welding. Only a few conditions may be added in acetylene welding, owing to its different procedure.

As we reviewed the reaction between acetylene and $O_2$ we noticed that one volume of acetylene required 2.5 vol. of $O_2$ for complete combustion. But in some parts of the flame, especially at the tip and inside, or in the air surrounding the flame, insufficient $O_2$ causes incomplete combustion as indicated in the following equation:

$$C_2H_2 + O_2 = H_2 + 2CO$$

and a variable amount of CO is produced particularly in closely confined, illy ventilated places. It is well known that CO is a chemical asphyxiant, and CO poisoning is a considerably important problem in industry.

Another source of hazard in acetylene welding is acetylene gas itself escaping from the apparatus without burning. This is either due to $O_2$ deficiency or to faulty equipment; and may cause hazardous cases, especially in confined places. Acetylene gas is odorless when it is quite pure, but frequently has a garlic-like odor. It is 0.95 times as heavy as air and also physiologically an inert gas. It is classified among simple asphyxiants. Its anesthetic action is due to its asphyxiant quality. Acetylene asphyxia is not uncommon among welders.

Moreover, impurities in commercial acetylene may cause hazards. These impurities, either due to the production methods of acetylene or to calcium carbide from which it is produced, are hydrogen phosphide (phosphine), hydrogen arsenide (arsine), ammonia, and hydrogen sulphide.

Of these impurities, phosphine produces symptoms of phosphor poisoning, and arsine is a powerful nerve and blood poison which causes pigment changes and hemolysis. Ammonia is soluble irritant gas and affects the respiratory tract. Hydrogen sulphide has also an irritant effect on mucous membrane and a severe action on nerve cells.

Besides the previously mentioned hazards encountered in welding, frequent burns and eye injuries, resulting from spattering of molten metal particles, may occur, sometimes in spite of the use of some protective measures.

PREVENTION of health hazards in welding:

Prophylactic measures vary little for the two forms of welding. Briefly they are:

1. Immediate removal of hazardous sources, by:

(a) Welding in outside air, if it is possible.

(b) Locating exhaust hoods or any dust collecting devices (flexible exhaust ducts are useful).

(c) Dilution of the air by forced ventilation.

2. Individual protections, by:

(a) Various and suitable respirators and air line masks.

(b) Goggles, gloves and overalls.

(c) Periodic and systemic physical examinations to detect the prodromes and preliminary symptoms of chronic poisoning.

(d) Careful pre-employment examinations to reject the individuals having nervous troubles, anemia, eye troubles, and pulmonary infections.

(e) Taking extreme cautions in all procedures involving zinc or galvanized metals.

(f) Instruction of unskilled welders about the implication of the sputtering of the flame as a warning of insufficient $O_2$ supply.

(g) Insuring of an adequate supply of $O_2$ in the surrounding air by ventilation and aeration of the working places, especially confined spaces such as the interior of tanks, etc.

(h) Using an acetylene having a high degree of purity.

(i) General education of welders.

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# The Pre-Employment Physical Examination

*—As an Aid to a Construction Company—*

W. H. D. HINCHMAN, R. P. E.,
*Resident Director for the Esslinger-Misch Company, Constructor-Managers of the Vigo Ordnance Plant, Terre Haute, Indiana*

THE shortage of manpower created by the present emergency demands that we secure the maximum number of man-hours from each employee. At the outset of our job a sanitation and safety manager was employed to further this effort. His function was to provide a sanitary working environment and to coordinate medical and first aid facilities with the safety program. The pre-employment examination was necessary in order to determine the physical condition of each man and to assure his placement in a position commensurate with that condition. Also, the examination was intended to facilitate a more intelligent treatment of cases in the first aid stations and hospital.

The sanitation and safety manager, in conjunction with the personnel division, worked out a pre-employment physical examination that was acceptable to all concerned with the construction of this project. The factors to be considered in determining the type of examination to be used were: (1) the quality of men available; (2) an examination sufficiently thorough to eliminate unnecessary insurance risks; (3) the reaction of organized labor; and (4) the personnel and facilities at hand.

In the past the pre-employment physical examination has been used to determine physical defects present at the time of hiring, in order that the employee might not be able to claim injury that had happened previous to his employment. Where a physical impairment would not interfere with his duties, the employee was done an injustice by the employer's refusal to hire him and take the responsibility of aggravating an existing condition which would make the employer liable and increase his insurance rate. With this thought in mind, our company wished to go farther with the pre-employment physical examination and place men on jobs where existing physical impairment would not be aggravated. Thus all men with hernias were hired and placed on work suitable to their condition.

In order to avoid possible labor difficulties with the Vigo Building Trades Council, a meeting of all business agents was held, with the sanitation and safety manager and the chief of personnel present. At this time many labor relation problems were discussed, the policy of the company was set forth, and the pre-employment physical examination was talked over. At first there was considerable antagonism on the part of the business agents, but after an explanation of what was intended and the presentation of the safety factor involved, these men readily agreed to the proposal. Of the entire group only one trade refused to submit to the examination, and the number of their men employed was negligible.

The physical examination included: (1) a brief personal history; (2) the type of work the man was to perform; (3) the general appearance—healthy or otherwise; (4) deformities noted; (5) check for varicose veins; (6) hernia; (7) condition of the applicant's spine; (8) condition of the heart; (9) pulse; (10) blood pressure; (11) vision; (12) hearing—whisper test; (13) check on vaccinations for smallpox and typhoid, and the date of these inoculations. At the conclusion of the examination the doctor indicated that the man was physically capable of doing the job assigned, or refused to pass him for employment. The refusals were less than 1% of those examined.

THE physical examination was the first step in the processing of these men for employment. If the man was rejected physically, no further processing was necessary. If the man was accepted, a copy of his physical examination form was checked for possible remediable defects, and he was sent to an interviewer in the department of sanitation and safety. This interviewer discussed with the employee the probable dangers from the existing condition and made recommendations for correction; for example, infected teeth may cause (1) congestive disturbances, (2) rheumatism, (3) arthritis, (4) possible heart ailments, (5) incomplete or improper digestion resulting in headaches and a general run-down feeling, (6) the development of gum disturbances, and (7) a very unsanitary and unpleasant oral condition. Personal hygiene was discussed with the individual as a part of the general war effort, and he was urged to correct the conditions in order to save lost man-hours, which, in turn, would not only help his country but would also promote the well-being of himself and his family. This information was very acceptable to the average employee, and the common response was that it would take two or three paydays in order to be in a position to have the corrections made. The employee was told that at the end of 30 days we would check with him to find out if anything had been done relative to the corrections.

After the man had been at work for 30 days, a card was mailed him to determine if anything had been done toward correction. A regular form card for each type of impairment was sent to all men who were interviewed at the time of employment; for example, those with defective teeth were asked: "At the time of your examination at the Vigo Ordnance Plant it was recommended that you consult a dentist in regard to your teeth. Please answer the questions on the attached card and return as soon as possible. Failure to return this card will indicate that nothing has been done." The return card requested the following information: "Did you consult a dentist? What treatment was recommended? What treatment was given? If you did not see a dentist, when do you plan to have this work done?"

From July 1 to November 1, 1942, 2297 employees were interviewed. Thirty days from the date of employment 1160 cards were mailed. Cards returned signed by the employee, his doctor, dentist, or both, showed the following results obtained: 252 had teeth cleaned or extracted; 71 obtained new dental plates, and 29 are having their gums treated; 60 secured glasses; three had eye operations; and 13 had minor eye corrections. There was one tonsillectomy; five had tonsils treated; two had ears treated; and one case of acne is being treated. There was a total of 447 corrections; 18 cases where treatment was not deemed necessary by the attending physician, and 120 cases where plans had been made for future corrections; while 37 reported they were financially unable at the present time to have corrections made, 10 reported nothing whatsoever done, and six errors were made in mailing the cards.

At the beginning of the job men with existing hernias were not refused employment; however, after the job was under way it was decided that each hernia case should have a properly fitted truss in order to continue work. Although we had 231 employees showing partial or complete hernias, none was rejected for this reason. Of these 154 were properly fitted with trusses, and 77 had been terminated prior to the time of the decision to require trusses.

In order to complete the follow-up of the cases interviewed, it was necessary to contact all persons who did not reply to our card questionnaire. This was

accomplished by a five-minute interview with the men on the job. This method materially increased the number of corrections. The following results were obtained from the 115 interviewed for the second time: 43 cases had teeth extracted, treated or cleaned, and seven obtained new dental plates; 24 made appointments for dental work. There were seven cases of eye corrections, with four securing glasses and one having an eye operation. There were five other minor corrections. Seven of the 115 were not interviewed, 14 cases reported plans for future corrections, and three cases were financially unable to have the corrections made.

A BRIEF summary of the results of this follow-up work reveals that:

1. When men are aware of physical defects which may decrease their earning capacity, they will very gladly cooperate in having the same corrected.

2. If the proper approach is used in the interview, it will assist in obtaining a satisfactory percentage of corrections.

3. Cards mailed to the employees serve as a reminder of the personal interview and are a good means of obtaining results from it.

4. In the second interview results were obtained that were never reported by mail, and many future appointments and corrections were made.

It is the opinion of the writer that the average workman is a typical American and will not take time out from regular duties for his own physical welfare unless constantly reminded of the dangers and sacrifices that his family and himself will have to endure as a result of a condition that may be avoided by a simple correction. From the standpoint of the employer, service of this kind to employees will go far toward building a better employer-employee relationship, thereby increasing the amount and quality of work produced, as well as being a factor of safety in the performance of the same.

It is very difficult to estimate the number of accidents that might have been caused on this job on account of the 323 cases with bad teeth. These bad teeth would undoubtedly have caused much pain and disagreeable feeling during working hours, and this is a kind of irritability that naturally takes precedence over the work being done. Owing to the fact that between 80 and 90% of all accidents are due to carelessness, elimination of such a distraction is a truly great factor in the safety program. The same can be said in regard to the 76 cases in which eye corrections were obtained.

A study of the employees' reactions to the interview reveals that a large majority of them felt that the Esslinger-Misch Company was doing them a real favor. The many statements of the men received by the interviewers revealed their appreciation. It is the opinion of the writer that this type of personal contact with employees, besides paying dividends from an economical standpoint, will go far toward resolving many of the labor differences which might arise between employer and employee.

In conclusion, the writer wishes to express his deep appreciation to the sanitation and safety manager, Harry Ockerman, for the coordination of this fine activity in his program, and for the tactful approach used by Mary Maple and Foster Coyle of the sanitation and safety department, who interviewed the employees during the progress of this work. The writer sincerely believes that this type of service is as economically sound for the small contracter as for the larger companies.

## Sixty Years in Practice

IT IS a rare privilege, given to few, to be able to look back from the evening of age, upon a professional career of more than three-score years. And rarer, even, when those years have witnessed the chosen field advance with such giant strides as have measured the history of the practice of medicine. Such, however, is the lot of DEWITT C. RODENHURST, of Philadelphia, Jefferson County, New York, physician and surgeon since 1879, and now, and for some time past, district surgeon for the New York Central.

DR. RODENHURST was born in 1855; taught school for five years of his early manhood; graduated from Long Island College Hospital, Brooklyn, at 24. Interestingly he comments: "I have always been a 'country doctor'—have lived in my present location, a village of 800, for more than 60 years. At my time of beginning practice we had few remedies—tinctures, fluid extracts, powders. If we used pills, we made them. I possessed what was called an operating case, with a few knives, catheters, dressing forceps, hypodermic syringe, and several smaller instruments. For the hypodermic we used what was known as Magendie's solution (15 grains of morphine to the ounce). The first handy remedy, I recall, was a tablet with the dose incorporated. Depletion was usual; bleeding was quite largely done. If an individual had diabetes, then called 'Bright's,' he was practically without help. I am sure I administered the first dose of diphtheria antitoxin given in this North Country. The patient recovered. There were no regular surgeons or specialists in those days. You had to do your own surgery, or get some older man who had more experience. I preferred to do my own work; and I have done minor surgery of eye, nose and throat; tapped chests for fluid, serum or pus, and abdomens for fluid; and amputated forearms and legs—all with apparent success. I saw the first carbolic spray instrument used in Bellevue Hospital in New York. A professor-doctor ordered it out of the way. He wore a Prince Albert coat, which was the style at that time, and a button-hole bouquet. He was amputating a thigh. In obstetrics, I suppose I have had the usual country doctor's experience. Living in a rural community, I have not gone beyond a probable 1000 births. In those I encountered all the difficulties of such work. I have done version quite a few times, alone, distant from any other physician, without an anesthetic, and under poor light. I believe my successes have been more than usual. Looking back now, from these days of supportive remedies, exact doses and combinations, insulin, antitoxins and sulfa's, I marvel that we got along. But we did. Incidentally, I wonder when the new sulfa's will find their level.

"I have been fortunate in having been able to travel. I have visited Alaska, Canada, all the countries of World War I in Europe, the principal islands of the Caribbean, the Bahamas and Trinidad, and parts of northern South America. For 12 years I was U. S. Pension Examiner. Here I had to measure eyes for glasses; have fitted about 1400 pairs of lenses. In community affairs I have been justice of the peace, village trustee, and coroner. I am Episcopalian, Scottish Rite 32nd-degree Mason, and Shriner. I was 88 years old on January 26, 1943, and I still do some work in my line." DR. RODENHURST is an Honorary member of the county and state medical societies, and an "honorary subscriber" to numerous medical journals.

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DR. EASTON calls attention to the fourth line of the last paragraph on the first page of his article on "Carbon Tetrachloride" in INDUSTRIAL MEDICINE for January, where the figures should have been: "according to Flury,[8] 25,000 (instead of 5,000) p.p.m. endanger life, etc."

## WAR CONFERENCE

*—Rochester, New York, May 24-27, 1943—*

HUNDREDS of experts will report in Rochester, May 24-27, 1943, on the state of the nation from the industrial health standpoint." Thus says the *Rochester (New York) Democrat & Chronicle;* and well and truly says—for they *are*, indeed, the "experts" who are gathering together; and they *will*, indeed, "report on the state of the nation" as to the actual, day-by-day, practical values of industrial medicine, industrial surgery and industrial hygiene, expertly applied under wartime emergency conditions. They are the medical men who, long ago, *made* industrial medicine and for a quarter-century have been practicing industrial medicine; the engineers and scientists who pioneered industrial hygiene and, for the shorter but no less important period since it began, have been practicing industrial hygiene; the career-men, who formulate the rules and establish the precedents that distinguish the field of their work.

The occasion will be the joint convention of the AMERICAN ASSOCIATION OF INDUSTRIAL PHYSICIANS AND SURGEONS, the AMERICAN INDUSTRIAL HYGIENE ASSOCIATION, and the NATIONAL CONFERENCE OF GOVERNMENTAL HYGIENISTS — the twenty-eighth annual meeting of the Industrial Physicians and Surgeons; the fifth of the Industrial Hygienists; and sixth of the Governmental Hygienists, as well as their first meeting outside of Washington, D. C.

THIS is a year of conventions postponed and meetings and conferences deferred. But it is also a year when the wartime significances of the work in which these experts are engaged and the necessities of its continuation and extension make this "WAR CONFERENCE" advisable, if not imperative. Numerous new problems and accentuations of old ones have their origin in the wartime emergency conditions under which industries of all kinds and in all parts of the country are operating. These problems are as numerous and varied as the products that are being made; and, while some are common to a large number of plants, all are of special and immediate importance everywhere. Among them are the medical and hygiene questions involved in the mass entry of women into industry; older-age employees with their various associated problems; proper placement and employability considerations of the 4F rejectees; rehabilitation and proper employment of those already discharged from the military services because of disabling conditions; new industrial health hazards from new processes and the use of substitute materials; absenteeism; fatigue; nutrition; effects of long hours, and of brief rest periods; double shifts; two-job workers; overtime; increased industrial accident rates; advances in the treatment of illnesses and injuries, and many others.

The complexity of the aggregate of these problems may be gathered from the fact that, in almost every response to the exigencies of the war, they involve in some degree—and often in a potentially dangerous degree—the elements of a situation that can be handled only by the industrial physician and/or the industrial hygienist. It is well, therefore, that these experts who are solving these problems are to meet and exchange experiences on the common ground of their demonstrated results in day-to-day practice.

NO ONE expects, of course, that this conference will evolve solutions for all these problems. Four days isn't enough time for more than a few. The statement of them, however, is indicative of the scope and wartime importance of the work in which those who will be in attendance are engaged. The emphasis of the medical men will be on medical matters; that of the industrial hygienists on the procedures and techniques of industrial hygiene. The relation of these to the general welfare of employees will be especially emphasized to management in the joint session which it is planned to hold with the New York State Industrial Congress also scheduled to have its convention in Rochester during the same week.

It is well known that industrial physicians and surgeons and industrial hygienists throughout the country are working in most cases almost to the limit of their capacities. The 40- or 48-hour week means nothing to them; very few are away from their work for much more than the time they have to relinquish to sleep. All of them, however, are constantly aware of the fact that the employees in their charge must have periods of change from their jobs; they are constantly stressing the good effects of the enforced rest periods in their plants, and the better work that results when there is a definite break. Looking forward to the continuation of their own intensity of labor for the duration and beyond, there is hardly one of them who doesn't realize that he, himself, needs a change, if only for a day. The "WAR CONFERENCE" will give him just the proper breathing spell—a day or two away from his environment, but still not away from his work—while it will be at the same time a day or two of refreshment in that he will get much of value to help him when he returns, and will carry home the pleasant memories of old acquaintances renewed and new acquaintances made.

DR. WILLIAM A. SAWYER, medical director of Eastman Kodak Company, and one of the outstanding leaders in industrial medicine, is general chairman of the convention; DR. J. R. STERNER, also of Eastman Kodak, has charge of the program for the American Industrial Hygiene Association; and LIEUT.-COMMANDER J. J. BLOOMFIELD will arrange for the sessions of the Government Hygienists. The days of the joint meetings are Monday, Tuesday, Wednesday and Thursday, May 24-27, 1943; and the headquarters will be at the Hotel Seneca. The tentative program will be announced shortly. Meanwhile it is suggested that hotel and train reservations be made at the earliest possible moment.

**WAR CONFERENCE**

**American Association of Industrial Physicians and Surgeons**
(Twenty-Eighth Annual Meeting)

**American Industrial Hygiene Association**
(Fifth Annual Meeting)

**National Conference of Governmental Hygienists**
(Sixth Annual Meeting)

**Headquarters: Hotel Seneca**

**May 24-27, 1943 Rochester, N. Y.**

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## Absenteeism in the News

THE items on absenteeism beginning on page 44 are typical of the kind of publicity that subject is getting. The British translation of weeks of sickness into planes, tanks, etc., has its numerous counterparts here in newspapers and broadcasts, as well as in the *Congressional Record*. Most of these translations are unfair; some are fantastic—the Congressman's "42 Liberty ships" for example. They are based on the false premise that absenteeism always holds up production. By the tests of actual decrease in the output of the things the absentees would have worked on if they hadn't been absent, or actual increase if all of them had worked instead of being absent, it will be found that production was interfered with very little, if at all. Except in rare instances, such as the much publicized one where 26% of an airplane factory's workers stayed away the day after Christmas, the effect of absenteeism as it is encountered in the daily percentages is not on output but on payroll. Any other basis assumes 100% of production from 100% of payroll—something that has never been possible in general, and never will be. And regulations, penalties and politics are not the answer. The more compulsion that is imposed on the non-medical phases, the more the medical will increase —headaches, sore backs and colds on the report sheets will cover a multitude of reasons, a magnitude of self-defense. It might be a good idea to call a parade of employees before a Congressional committee and ask them their real personal excuses for being absent from work—ask them why they stay away for other than *bona fide* medical causes. Possibly that hasn't been done for fear that some honest and outspoken American worker will tell them, as thousands more undoubtedly want to tell them, the simple truth: "Just too damn much regimentation!" The "one point" from Undersecretary Patterson's office (page 52) is the first recognition of this truth that has come out of Washington. It is a truer and deeper truth than the regimenters suspect, and more will be heard of it.

Meanwhile the British Ministry of Labour emphasizes (page 184) that "a solution of the problem of voluntary absenteeism is more likely to be found by those establishments which look for it within themselves than by those which tend to rely more on external powers of discipline or punishment." If the wisdom and commonsense of this conclusion do not prevail here, it will be because a solution is not the primary purpose of regulation.

## War Conference

ABOUT 26 years ago, on America's entry into the other World War, DR. FRANKLIN MARTIN, for the War Industries Board, called a meeting of a hundred or more industrial physicians and surgeons in Washington to organize the industrial medical necessities of the war period. The idea was to plan what to do, as well as how to do it. This year the industrial physicians and surgeons are calling their own meeting—not to plan what to do (they have long known that), but to report and exchange experiences as to what they are doing and have been doing throughout the entire period of emergency production.

The small group then has become the large group now; the industrial medical pioneers of that war are the skilled industrial medical specialists of this one. Their advance is the record of a quarter-century of accumulated knowledge and experience. The result of the advance was that they were ready when the emergency began. And during the strenuous two years since it began, and despite the transfer of the skills and abilities of many of their number to the armed forces, they have not only maintained all the high standards of their own medical services but have also counselled and directed the beginnings of many others. In addition they have responded generously and patriotically to the need for men of their standing and experience to educate, guide and instruct general practitioners throughout the country in the principles and applications of the increasing amount of industrial medical practice they are being required to handle on account of the country-wide distribution, and concentrations in new localities, of employees in war enterprises. It is not accidental that so many of the industrial health institutes given by the state medical societies, as well as the industrial health meetings on the county level, have among their speaker-instructors one or more of the group that met in Washington 26 years ago at DR. MARTIN'S behest.

The meeting of the original hundred is recognized in the medical history of the other war as having been a vital contribution to that war's organization. Most of the hundred have survived to take their places in the front line of professional activities in this war. It is time they met again—along with the added hundreds of equal rank in their own and related professions who will join with them to make their WAR CONFERENCE at Rochester next May (page 155) as important and valuable to the intensity of the war production under way now as the meeting so long ago was in getting things started then. The certainty that it will be thus important and valuable makes this WAR CONFERENCE the 1943 MUST in industrial health.

# *Now* IT'S EVEN MORE IMPORTANT TO PRESCRIBE

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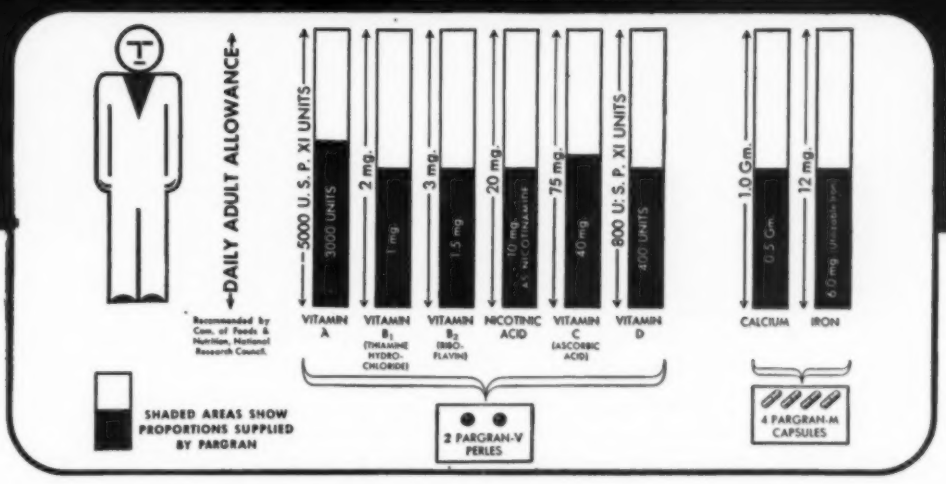


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THE BENEFITS OF MULTI-VITAMIN PREPARATIONS AS REPORTED IN THE RECENT A. M. A. ARTICLE.[1]

# Between-Meal Eating

# Often Cause Of "Hidden Hunger"!

## Don't Let a Dietary Deficiency Sabotage Her

Industrial workers need all the food-energy they can get. When they fail to obtain it from "three squares" a day, most workers reach for a snack. Eating between meals may satisfy hunger . . . even increase ability to produce... but what about nutritional requirements?

Fully two-thirds of the calories in the average worker's diet are provided by refined sugars and fats . . . foods which are practically vitamin-free.[2] At the same time, other food factors considered essential are removed from the remainder of the diet by improper storage, processing and cooking.[3] As a result, millions of war workers are suffering the detrimental effects of dietary deficiency . . . "hidden hunger."[4]

### *How Can Industry Help to Improve Nutrition?*

Many industrial plants already are sponsoring educational programs to improve nutrition among workers. But it may be years before real improvement becomes noticeable. Meanwhile, if nutrition is to be improved *now*, nutritional supplements must be applied.

### VITULES... *A Scientifically Balanced Supplement*

As a physician, you appreciate that a dietary deficiency cannot be attributed to the lack of one vitamin alone. In most cases, a deficiency in one vitamin is accompanied by a deficiency in others. Symptoms caused by missing dietetic factors may be so mild at first as to escape detection. Therefore, it is safer, and more desirable to prescribe a multi-vitamin preparation like VITULES as a nutritional adjuvant.

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# Fractures

## —About the Ankle—

E. P. GILLETTEE, M.D.,
*Consultant in Orthopedics,*
*Robinwood Hospital, Toledo*

I HAVE chosen to limit my remarks largely to technique in the hope of emphasizing the need of all of us to continue eternally to preach: "Get them early and give them adequate care in fresh fractures."

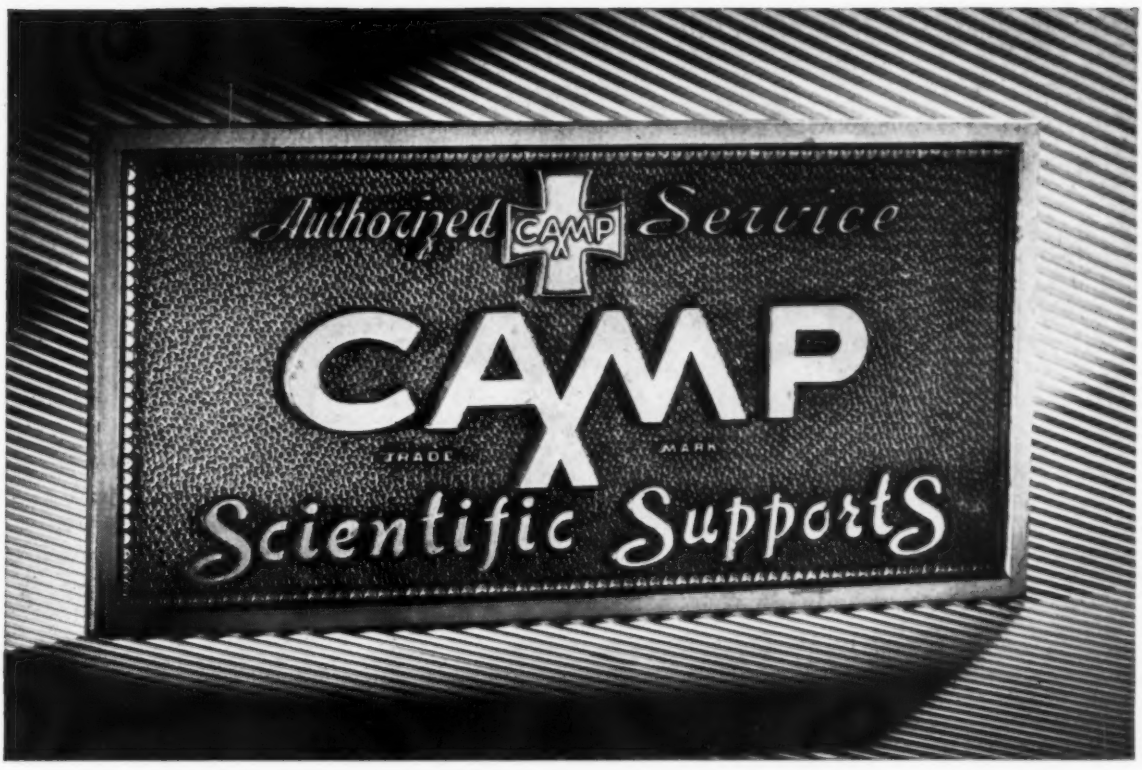
While tremendous forward strides have been made in the past few years in the treatment of many of our difficult fractures, it seems to me that sufficient emphasis has not been placed on certain traumatic conditions which are disabling if treated inadequately, but are not apparently immediately serious. In looking over the records of the statistical writers I find that the number of poor or only fair end results of certain major types of ankle fractures is inordinately high.

In searching for the reasons it appears that the tendency to regard these certain ankle fractures as relatively minor, and the tendency to treat them by closed reduction and external fixation only, are a large contributing factor. Campbell points out that traumatic arthritis, with pain on motion and weight-bearing, and severe disability are particularly common following inadequate reduction of these ankle fractures. This means, of course, disability of the entire extremity, with resulting economic and physical disability of a major and permanent nature. Because of the foregoing, I wish to plead for a more universal adoption of the principles of reconstruction of injured bone which we already know and apply to other parts of the skeletal system fairly routinely, but not commonly enough to these fractures. I refer particularly to open reduction and internal fixation if reduction by closed methods has not been accurately and immediately successful in the fresh fracture. It should be emphasized that if traumatic arthritis, with all it implies, is to be avoided in ankle fractures, accurate reduction must be obtained and maintained until union occurs.

THERE are four main fractures of the ankle joint involving the tibia and fibula which fall into the class to which I refer. They are:

1. The simplest type, which is the eversion fracture involving the lower end of the fibula without fracture of the internal malleolus. If lateral displacement occurs the deltoid ligament may be partially or completely ruptured, allowing the astragalus to be displaced laterally with the fibular fragment. The end result of the mal-union is a valgus deformity and marked disability. When seen fairly early a simple osteotomy of the fibula, followed by manipulation and sometimes wiring or nailing of the fibular fragment, usually effects correction. If, however, mal-union has existed for a considerable period, the space between the internal malleolus and astragalus is filled with scar tissue, and this must be excised through a separate incision so that the astragalus can be approximated to the internal malleolus. The principal point is whether the normal relationship between the articular surfaces of the tibia and astragalus has been changed or not. If it has not, then a supramalleolar osteotomy may be done just above the joint line to correct the angulation, thus restoring good weight bearing line. These secondary procedures can be avoided if the fresh fracture of the fibula is nailed or wired when there is the slightest tendency to displace at the time of the original reduction.

Presented at the Toledo Annual Meeting of the ASSOCIATION OF SURGEONS OF THE NEW YORK CENTRAL SYSTEM.

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2. The second type is the bimalleolar, or Pott's, fracture. Many of these can be reduced satisfactorily by conservative measures, but if the position cannot be maintained, surgery is indicated. Usually open reduction and internal fixation of the fibula are sufficient. Occasionally, however, reapposition of the internal malleolus is not satisfactory, and in this event a second longitudinal incision should be made over the distal and mesial aspect of the tibia, and, after open reduction, a nail or screw may be driven through the fragment upward and laterally into the shaft of the tibia.

If mal-union in this type of fracture has already occurred, the supramalleolar osteotomy of the lower end of the tibia and fibula to correct the weight-bearing line is usually sufficient. But if there is an associated separation of the internal malleolus from the mesial side of the astragalus, it is also necessary to open the joint and remove the intervening scar tissue to permit reapproximation of the internal malleolus and astragalus. If this condition is of long standing and signs of traumatic arthritis have already developed, Speed indicates that the procedure of choice is fusion of the tibic astragalar joint, and particularly if there is an accompanying rupture of the interosseous ligament, with diastasis of the lower end of the tibia and fibula. However, if there is no apparent arthritic factor, the diastasis may be corrected by drawing the lower ends of the tibia and fibula together with wire after the joint scar has been removed surgically.

3. The third fracture is the trimalleolar, or Cotton's fracture, which involves not only the external and internal but also the posterior malleolus. This fracture, more often than any other, requires open operation. Owing to the added fracture of the posterior lip of the articular surface of the tibia, the astragalus is displaced backward and laterally, making an eversion of the foot. The indications for open reduction depend somewhat on the size of the posterior tibial fragment, but chiefly on the likelihood of permanent irregularity of the distal tibial articular surface. If proper apposition and alignment of the tibia and astragalus cannot be maintained, and they commonly cannot, the displacement will eventually interfere with the integrity of the ankle joint, and therefore open operation is advisable. If it is not done pain usually will persist and subsequent fusion may be required.

The open operation consists of reduction of the posterior malleolus through a postero-mesial incision and nailing or screwing this fragment into accurate position. This will many times be sufficient to permit satisfactory alignment of the internal and external malleoli by closed manipulation. However, roentgenographic examination should be made while the patient is still on the table, and, if reduction has not been obtained accurately, then one or both of the other two malleoli should be reduced and nailed or wired by the open method in addition.

4. The anterior dislocations with fracture of the anterior margin of the tibia are not common, but if the tibial fragment is of any size it should always be nailed through an anterior incision.

COMPARING the frequency of the different types of fractures of the ankle joint with the permanent disabilities which are caused by them, it appears that the bimalleolar fractures with outward displacement of the astragalus, and the trimalleolar fractures carry the highest percentage of disability. The patients suffer from pain and restriction of motion; the ankle is failing in the ordinary purposes of function, and operative repair is required. If it would seem that normal function cannot be restored, then fusion of the tibio-astragalar joint is the procedure of choice.

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Steindler states that the results of fusion of the ankle joint are excellent in 84.6% of his cases and notes the indications to be as follows:

1. In Pott's fractures where there are definite arthritic changes, roughening or distortion of the joint surfaces.

2. In the mal-united trimalleolar fractures of long duration, with posterior displacement of the astragalus and upward displacement of the posterior malleolus.

3. In other fracture deformities where deformities cannot be corrected, or where correction would require such extensive manipulation and operative procedures that subsequent degenerative changes of the ankle joint would appear inevitable.

At the time of operation for fusion, pronounced mal-alignment, if present, should always be corrected by refracture or supramalleolar osteotomy; otherwise consequent foot strain may be severely disabling. This additional procedure does not materially complicate the operation nor prolong the period of recovery.

Fusion of the ankle for mal-united fractures of this area is becoming more and more the procedure of choice, since the only functional defect is discomfort in walking over rough ground. If the ankle is fused in moderate equinus by the anterior route, sufficient compensatory motion is established in the subastragalar and tarsal joints to permit an elastic and practically normal gait.

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## Psychiatry in Personnel Work

LYDIA G. GIBERSON, M.D.

NO ONE can be more conscious than a personnel official of an "outer region" in employee relations which will not yield to any of the tried and tested formulae under which efficiency and production may be governed. It is in this "outer region" that the individual *resides* on and off the job. It would be asking far too much for the man who must concern himself with organizational management problems to explore the labyrinth of this outer region; hence, industrial psychiatry.

This branch of preventive medicine has, at least in rudimentary fashion, addressed itself to the problems of the individual as they apply to industry or government. I think it is not too much to say that industrial psychiatry can hold out a real helping hand to the harassed government personnel man who is struggling with the every-day working problem of excessive fatigue, emotionally maladjusted personalities, the employment of marginal labor groups, the crudities of green authority, racial antagonisms, sabotage, propaganda, inadequate protection, and uprooted social patterns.

### The Personnel Officer and the Individual

IF AN experienced personnel man were to ask himself the pointblank question: "What is the most troublesome basic question we have to face?", it is more than probable that he would find himself arrayed against the individual, the personal equation, the human being with his or her frailties, vicissitudes, and personal problems. With only a little further analysis, he will see that each employee duplicates in his personal life the social, physical, economic, industrial, and emotional forces which make our world what it is. Should these forces synchronize to form a completely harmonious personality, the personnel man knows that he has a valuable employee, an organic unit with which he may

From *Personnel Administration*, February, 1943.

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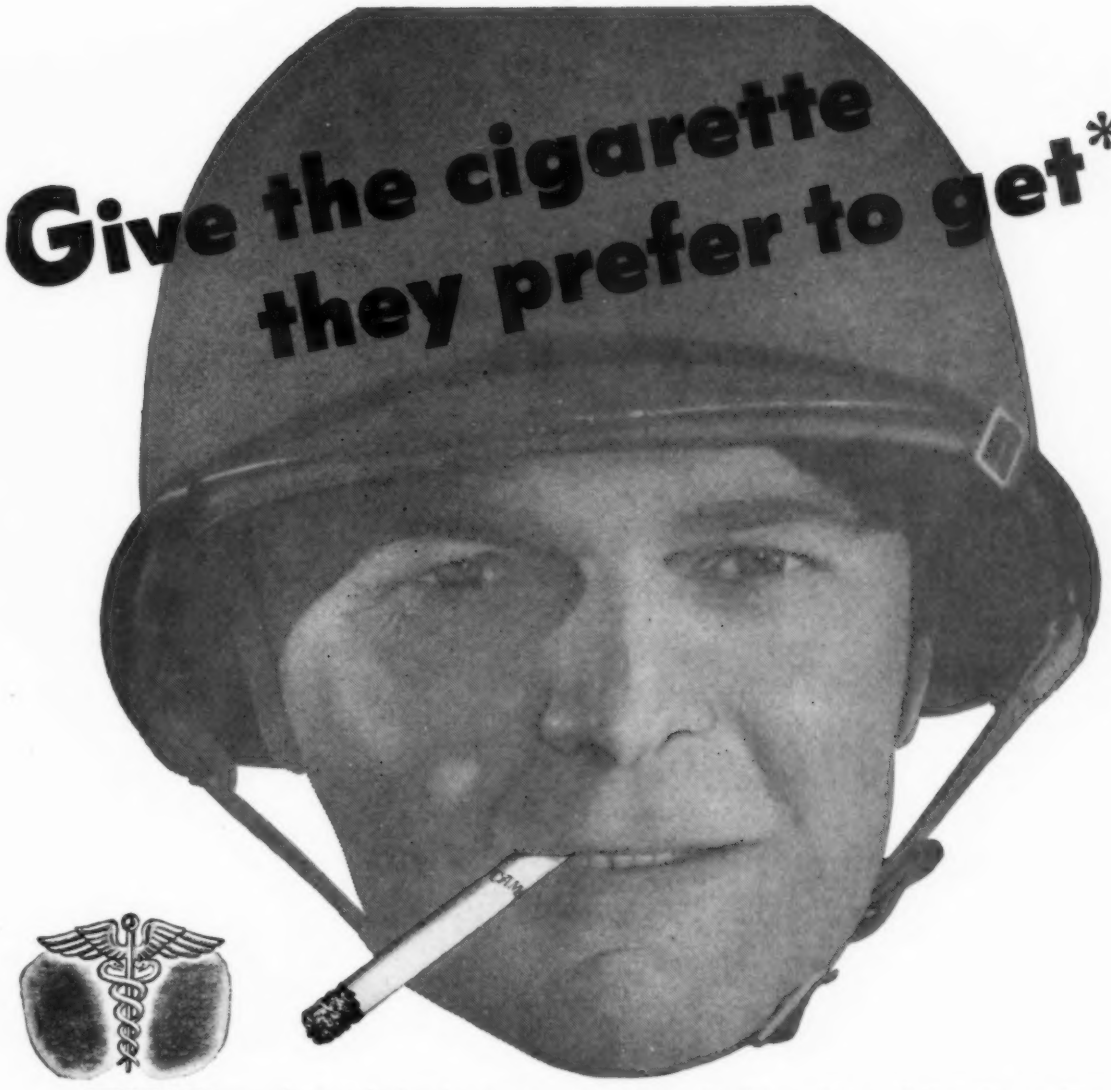

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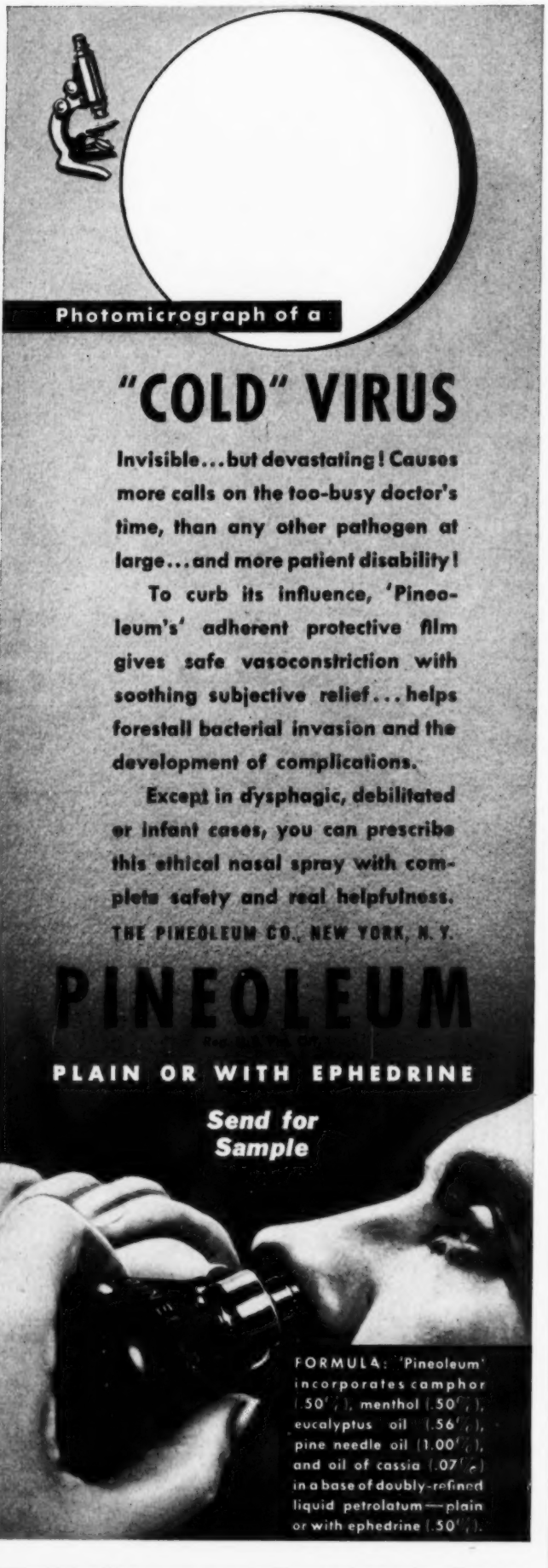
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build genuine industrial efficiency. But, if those forces should fail to synchronize, fail to implement each other, there is created immediately a maladjustment which impairs the employee's efficiency and which, in some cases, may render him economically unfit. In the early adjustment of these conflicts, and in the early recognition of the industrially unfit, the psychiatrist performs his unique industrial function.

It is no reflection upon the personnel man, his training, or his attitude toward "the job" that the individual becomes at times a more-than-baffling problem. The full life of the individual operates in such detail and in such emotional depths that, in the sheer economics of time and effort expended, the personnel man cannot deal efficiently with such delicate manipulation and control. The individual, again, will always appear to the psychiatrist as a world in himself, a single but complete instance of our civilization. On the other hand, the personnel operative must consider the individual employees as something in the nature of a fraction, a part of a specific group effort. In the final analysis, the personnel man is obliged by the nature of the industrial set-up to deal in groups, standards, efficiency quotas, and the various conglomerates which mass efforts make necessary. It has been the writer's good fortune to find that the majority of personnel men have come to their industrial niche thoroughly implemented and possessing a sincere desire for smooth and efficient organizational function.

It is also gratifying that industrial management and government have become increasingly aware of the crying need for emotionally harmonious effort. They have recognized that this emotionally harmonious effort is something which must be carefully distinguished from what is merely efficient functioning of employee groups.

### The Function of Psychiatry

IT IS probably at this point that the industrial psychiatrist can bridge an annoying and sometimes disastrous gap. It is unnecessary, of course, to remind personnel men that labor turnover is costly and therefore thoroughly inefficient. By bringing his special training and abilities to bear upon the individual employee's problems, the psychiatrist can salvage and make industrially efficient human material that has heretofore been dismissed for reasons only indirectly related to fitness for the industrial job.

The line of demarcation between a strictly employee-efficiency problem and one involving extraneous emotional pressure is one which the most conscientious personnel operative should not be asked to define. In all justice this is placing far too great a burden and moral responsibility upon an individual whose major efforts have not been in a field of medical responsibilities.

The personnel man who must concern himself primarily with matters of management, efficiency, and group effort cannot be expected to concern himself vitally with the myriad and finer-spun aspects of the single personality.

The function of psychiatry in large employed groups is to preserve the individual while adjusting him to the central effort. For it can never be forgotten that, no matter how large the group, an individual must remain an entity within himself—an entity whose personal life is of definite importance to the corporation employing him.

It is almost axiomatic that an employee's value to his organization is in direct ratio to the calm adjustment of his day-to-day existence.

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war-time picture. Due to the complete absorption with the physical and mechanical problems incidental to this growth, there has been a tendency to neglect the individual worker's hunger for personal significance and dignity. Our national productive system has been dislocated by a gigantic war effort whose further potentialities can only be guessed at. Victory most likely will bring a rapid and unprecedented world expansion of commerce and industry in which America will enact a leading role. Undoubtedly American industry will be a vastly changed organism. In all probability it will be a better organism, for into these years is being packed a great deal of growing. Movements and reforms which would ordinarily come about slowly, if at all, are now rushing forward rapidly.

The motive power for these social changes comes from two sources which have curiously implemented each other: first, the shock and upheaval caused by the depression years; second, the galvanic impetus of a national change to a defense and then to a war-time economy. The first gave rise to a broad interest in social casualties; it worked from the general to the particular, from the periphery to the center of its problems, and, prior to the war entry, was slowly growing toward a synthesis of all approaches—the political, the legal, the sociological, the psychological, the educational, and the medical. The second source, the change to war economy, let loose irresistible energy at the center, the heart, of industrial problems—the mills and factories themselves. The emphasis here is upon the immediate, the concrete, the particular—upon the complete utilization of industrial resources with all action subject to a central plan and a central emergency.

From both these sources have come the same aims: the conservation of manpower, the rehabilitation of marginal labor, dynamic activation of the apprentice system, the testing and use of individual capacities, and a direct concern with mental and emotional health of industrial workers and their families. Thus, the aims of a social reform movement have become basic rules of national self-preservation.

### The Indivisibility of the Worker

COUNTLESS searchlights have been turned upon the industrial worker and his problems in the past few years. Out of all this research has come the emphasis of one basic doctrine: the indivisibility of the worker as a social and industrial unit. The worker's personality as a unit is constantly in flux, varying in effectiveness and control with age and development crises; as a unit it is susceptible to pressure from the whole social area—home, family, community, nation, race, religion, conscience, industrial group, and whatever.

The industrial fraction of the worker's life cannot explain him, and it does not necessarily isolate him at any time from other parts of himself. The personality of the worker can, of course, achieve various degrees of abstraction, but these levels can be achieved without danger only when the whole personality is healthy and relatively free of emotional conflict. When adverse pressure does split off any part of a worker's personality, that worker is sick and needs medical attention. It follows, then, that preventive social and medical action should be based upon a complex and inclusive analysis. Partial technics, while they may give individual aid, cannot be certain of their findings and cannot hope to attack the fundamental causes of maladjustment. Under social and industrial pressure the individual is malleable to a point, but there is an internal driving power that needs fulfillment and,

above all, self-respecting use; dissatisfaction and maladjustment will turn that power into escape channels which lead, most often, to social incompetency.

### What Psychiatry Is and Does

WE HAVE been using the words industrial psychiatry rather freely; what is it? Industrial psychiatry is a phase of preventive medicine which aims to detect and forestall serious mental and emotional maladjustments among industrial employees.

Why is industrial psychiatry necessary? Because out in our working world there are thousands of men and women living in unnecessary misery, who never get within reaching distance of a doctor or a hospital, sick people who are being discharged and disgraced when all they need to set them right is a bit of medical advice and some emotional first-aid. Maladjusted emotional factors, we know, can bring disaster upon any of us. In all decency we need and must have (and workers need and must have) some assurance that our actions when we are ill will be blamed upon the illness and not upon us. I have seen many workers with 10 and 15 years of satisfactory employment who in the hysteria of a single moment tore their records to pieces. Now put yourselves in their unfortunate positions and tell me which is the evidence of sickness, that 15 years of satisfactory service or that five minutes of hysteria? The why of industrial psychiatry is just as simple as that: to judge the actions of an emotionally sick employee as being typical and permanently characteristic is unjust and illogical. Is it not much simpler and much more efficient to eradicate the sickness instead of the employee?

Industrial psychiatry attempts to assess the personality in order that the job may be fitted to the man, a job which will satisfy his values and give scope to his creative energies.

There are other reasons for emotional first-aid. An adjusted worker is far more alert and efficient, and he is rarely absent from his job. Again, 90% of industrial accidents are due to personal factors such as carelessness, apathy, inattention, fear, and worry. Bring mental health to the employee, place him where his abilities fit, give him some concrete proof that we like him and value his ability, and we as a society shall have a measure of control over the dangers of industrial life which now seems unbelievably improbable.

### How Psychiatry Works

HOW then, does industrial psychiatry work? To a psychiatrist the worker appears as a self-sufficient unit; he is not merely a cog in the industrial machine, nor a check-number on the payroll. The whole of his life is viewed as a working, breathing unity, a unity which comprises mental, physical, emotional, cultural, social, and economic aspects. Any factor whatever which threatens the sweetness and mature synchronization of all of these aspects is a threat to the "health" of the individual concerned.

The psychiatrist must interview the employee personally. He must probe gently and classify carefully all the data at first hand, since causes deep in the private life of the workers may bring about in their logical sequence effects which are completely unexplainable on the surface. Avoidable fear, worry, hunger, unrest, illness, fatigue, and boredom cost many lives. Anger and irritability, bravado and horseplay, perverseness, and childishness all take a toll in maimed bodies and maimed personalities. To reach the cause of these and to compensate for them requires the whole picture of the individual and not just that aspect of him which is uppermost in an industrial plant.

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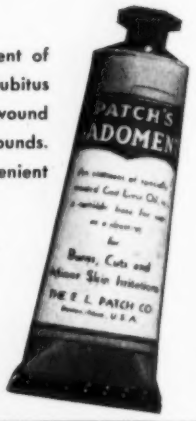

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Most employees are reluctant to obtrude their personal problems upon a direct superior, but in the quiet neutrality of the psychiatrist's office, emotional snarls can be met with a scientific detachment. The employee's trust and the doctor's competence work together to bring out the hidden causes. Let us say that Mary Jones is unhappy at her work and that her personnel adviser, noting her unexplained inefficiency, has suggested that she visit the resident psychiatrist. When Mary arrives at the psychiatrist's office she enters a "zone of neutrality," an atmosphere of informality and ease. To Mary that fact is of great importance. The office is a haven, a sanctuary wherein she knows that confidences are respected and where her frankness will in no way react upon her company record. Nine out of 10 times Mary proceeds to unburden herself, often in tears—an obvious relief from tension. Out comes the whole story, the hidden causes, mental and physical, which have been festering beneath the economic picture of Mary as the industrial world sees it. Once brought out in the open, the factors of Mary's problem are susceptible to prompt treatment; and another human being is righted, with resultant savings in personal happiness and industrial efficiency.

### The Benefits

Now whom will industrial psychiatry affect? Indirectly it will affect every employee in an organization where psychiatric services are used. Every employee will benefit in that the conditions which give rise to emotional maladjustments may be removed. It will concern more directly the following classes:

1. Those suffering with organic neurological conditions such as brain tumors, sleeping sickness, and epilepsy.
2. Frank psychoses, commonly called mental breakdown.
3. Psychoneuroses, commonly called nervous breakdown.
4. Maladjustments.

Those in the first two groups are obviously too sick to be at work at all, and their early detection and early care are very important; pre-clinical symptoms picked up by a trained eye may save industry much embarrassment and prevent suffering and disaster to those afflicted.

The two groups last mentioned constitute the source of most of the misery in industry. The psychoneurotic shows many symptoms detrimental to business efficiency and human happiness. The attitude of inferiority, chronic fault-finding, overdependence, daydreaming, worrying, chronic nervousness, and excessive fatigue are but a few of them. Maladjustments, again, may be due to personality clashes, to family tensions, to malnutrition (more common than one might imagine), and to the clearly recognized crises which appear in sequence in the life of the individual worker.

These four kinds of cases are those which the psychiatrist will search out and for which he will secure continued medical treatment. But, above all, he will do his best to unearth the causes of these ills and to prevent their recurrence.

What does industrial psychiatry hope to gain? Simply stated, industrial psychiatry hopes to gain a larger measure of happiness and mental health for American workers. Through a higher efficiency and a kindlier and more effective fellowship among workers of all types, it hopes to do its share in achieving the richer life our continent still holds out to us—to *all* of us.

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## SAL HEPATICA

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In the midst of a gigantic war effort it is impossible to have sufficient psychiatrists to meet the ever-increasing demands, but it is possible to apply sound psychiatric principles to personnel work through educational methods—educating the worker to better understanding and control of himself, and educating the supervisor. A great deal of training is being done today on all jobs as regards technical skills. In other words, in most instances, we have been teaching the supervisor to handle the machine but not the man. The supervisor, in his minor fashion, is an executive charged with the handling of people; obviously the extent of his production can be measured by his ability to correlate man and machine.

In the final analysis the proper handling of people may well be the deciding factor in winning the war. If all of us—personnel people, physicians, nurses and counsellors—have the proper philosophy in approaching this task, the result is a foregone conclusion.

## Information on Nutrition in Industry

INQUIRIES are often made by industrial groups as to how a start can be made in obtaining information about the nutritional status of employees. The question is also asked as to whether a survey of the workers' food habits is worthwhile.

The Sub-Committee on Nutrition in Industry, of the State Nutrition Committee of Illinois, has prepared the accompanying forms for the use of any company that wants to make a start. Form 1 contains an explanatory message to the employees and a short list of general questions. Form 2 represents a food record for one day.

It is to be understood that neither of these forms will secure all the information needed to come to an adequate conclusion with reference to the nutritional status of any employed group. But the proper use of these outlines should yield preliminary information which will indicate what further procedures may be advisable. They, therefore, represent a good beginning.

This approach is not a substitute for full information concerning eating habits, which can only be obtained by weighing food, and other scientific methods. It is believed, however, that these records will be of real value as indicated.

FORM 1

TO THE EMPLOYEES OF THE_____COMPANY

As you may know, a nation-wide program is being carried on to acquaint everyone with the fact that eating proper food and plenty of it is of great importance to the health of the people and the winning of the war.

The _____ Company is cooperating in this movement by sponsoring a Nutrition Program in its plants.

We should like to know whether the employees of the company are included in the one-fourth of the population that is eating a good diet.

The only way we can find out is from you. We are asking you to help us by writing down on the other side of this sheet the food you eat on one day (not Sunday) and by answering the questions below.

Supplying the information is purely voluntary. It will be used only for statistical purposes. No names are to be signed.

Please fill in the information and give it to your foreman within the next two days.

QUESTIONS

1. Age_____ Male___ Female ___ Nationality of ancestors_____
2. On what shift do you work?_____ Are you hired Monthly?_____ Hourly?_____
3. Is your work heavy labor? _____ Lighter work? _____
4. Have you lost time in the last six months on account of illness or accident?_____.
   If so, how much: On account of illness?_____ On account of accident?_____.
5. Do you carry your lunch?_____ Eat at the cafeteria?_____. Eat at the canteen?_____.
   Do you carry your lunch and get something more at the cafeteria or canteen?_____.

_____
Personnel Manager

FORM 2

FOOD RECORD FOR DAY_____date

Give food record for any day but Sunday. State kind and amount of food eaten at each meal. For fluids give amounts in cups, glasses or bottles. For solid foods state whether servings were large, medium or small.

| | Breakfast | | Noon Meal | | Evening Meal | | Between Meals or Before Going to Bed | |
|---|---|---|---|---|---|---|---|---|
| Type of Food | Kind | Amount | Kind | Amount | Kind | Amount | Kind | Amount |
| Milk | | | | | | | | |
| Coffee or Tea | | | | | | | | |
| Soft Drink | | | | | | | | |
| Soup | | | | | | | | |
| Fruit—Raw | | | | | | | | |
| Fruit—Cooked | | | | | | | | |
| Fruit or Vegetable Juice—Raw | | | | | | | | |
| Fruit or Vegetable Juice—Cooked | | | | | | | | |
| Potatoes | | | | | | | | |
| Other Vegetables—Raw | | | | | | | | |
| Other Vegetables—Cooked | | | | | | | | |
| Cereal | | | | | | | | |
| Bread | | | | | | | | |
| Rolls, Biscuits or Crackers | | | | | | | | |
| Macaroni, Spaghetti or Rice | | | | | | | | |
| Cheese | | | | | | | | |
| Eggs | | | | | | | | |
| Meat or Fish | | | | | | | | |
| Butter | | | | | | | | |
| Margarine | | | | | | | | |
| Ice Cream | | | | | | | | |
| Other Desserts and Sweets | | | | | | | | |

Prepared by the Sub-Committee on Nutrition in Industry of the State Nutrition Committee.

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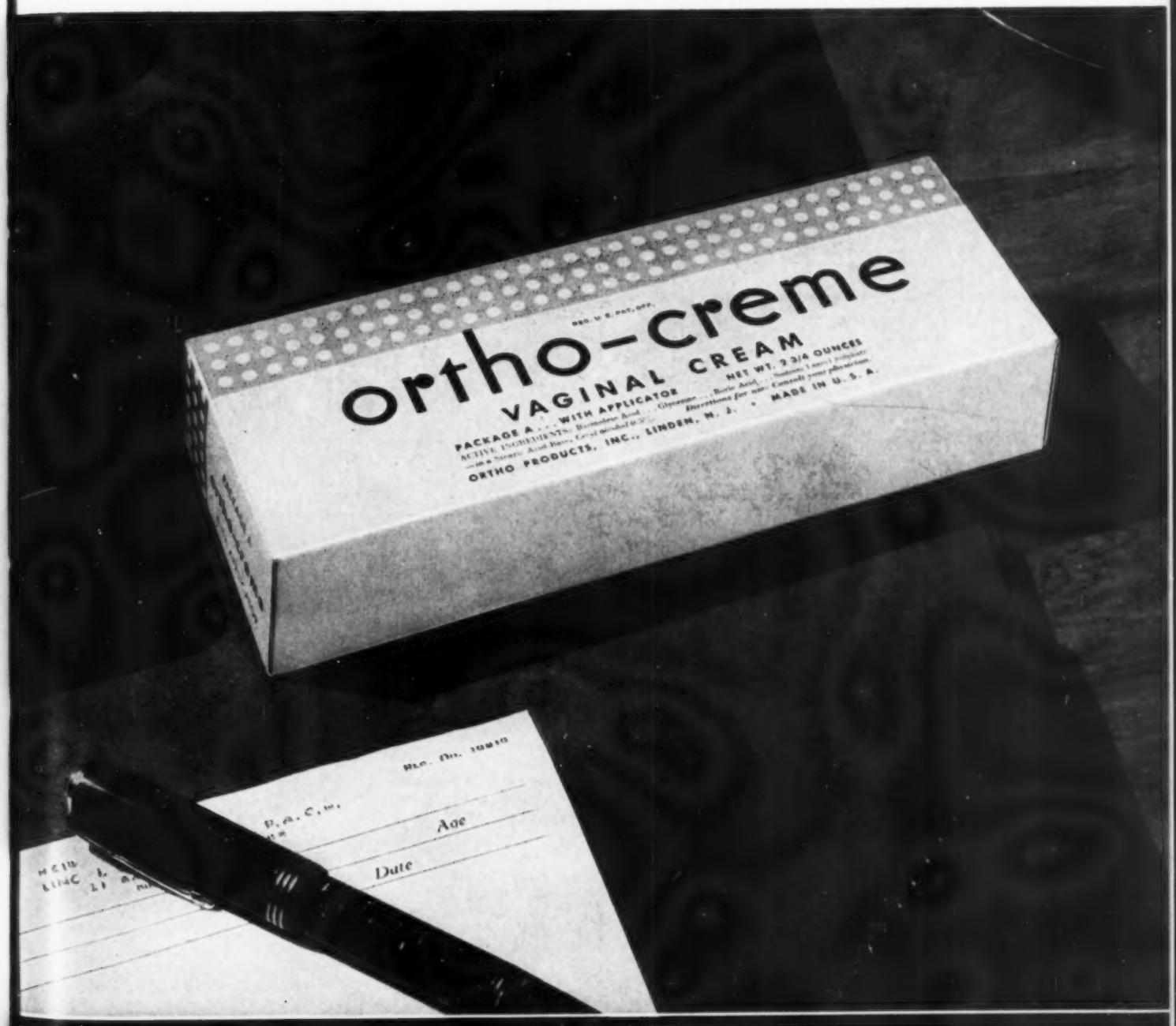


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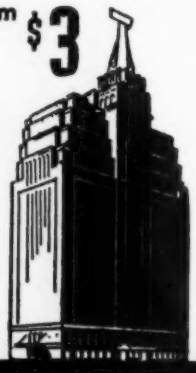

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## Wartime Industrial Services

*With Special Comment on the Permanente Foundation, California Physicians' Service and Procurement and Assignment Service*
*—Some Factual Information—*

SO MANY verbal fireworks were touched off at the recent Pepper subcommittee hearings in Washington that a review of the Kaiser medical situation in California is advisable at this time. Particularly is it important to analyze the Kaiser medical care plan and to consider it alongside the existing medical care facilities in the area where it works. The part of Procurement and Assignment Service in this picture is also worthy of mention.

Without going into the history of America's entry into the present war it is well to bear in mind that the Kaiser Company was building ships for Great Britain in its Richmond yards before this country had fired a shot. The company was also planning its expansion into United States Maritime Commission ship building in additional yards in Richmond.

Under California's industrial accident compensation laws the company was required to give medical care to injured employees. This was done under a plan by which several commercial insurance carriers handled the industrial accident liabilities. Full time physicians were employed for the joint insurance carriers to staff the field hospital and the five first aid stations. The field hospital and first aid stations were built by the Maritime Commission in the old and new Richmond shipyards. The equipment, ambulances and supplies were furnished by the Kaiser Company.

This process had been going on for several months before Procurement and Assignment Service was established.

To bring the picture up to date, there are now about 87,000 employees at the Richmond yards. The medical care of these employees for industrial accidents alone requires a staff of physicians, nurses and first aid workers.

With the tremendous expansion of employment rolls in the shipyards doing Maritime Commission work there came to the Maritime Commission a new sense of responsibility for keeping the men on the job, keeping the ships sliding down the ways. Officials of the Commission in Washington went to work on various plans for the extension of medical care to cover non-industrial as well as industrial illnesses of these employees. The theory behind this movement was that readily available medical care for everyday illnesses and injuries would result in keeping men on the job, or getting men back on the job in faster time, and would thereby save man-hours for essential war production.

The Commission reportedly approved the Kaiser plan of setting up a medical care program for Kaiser employees. This plan, working on the proceeds of a 50-cent weekly payroll deduction, was designed to give complete medical care and hospitalization to Kaiser employees who were injured or taken ill from non-industrial causes.

That plan is now in operation, covering some 52,000 employees at the Richmond yards who have agreed to the 50-cent weekly payroll deduction. These employees have available to them the facilities of the Maritime Commission field hospital and six first aid stations. They also have available a staff of close to 50 physicians, a 78-bed hospital in Oakland and full nursing and accessory services.

The plan is operated by Sidney R. Garfield, M. D., who has contracted to furnish medical care to Kaiser employees. The digest of the plan furnished to employees states that the "shipyards have agreed to make weekly deductions for the employees who have subscribed and on behalf of such employees to pay the amount deducted (50 cents weekly) to Dr. Garfield."

The combined plan of industrial accident cases and non-industrial medical cases has the following resources: The Maritime Commission provides a field hospital and six first aid stations. Mr. and Mrs. Henry Kaiser have provided over $500,000 for the Permanente Foundation and with this money have bought, rebuilt and renovated the

From *California & Western Med.*, January, 1943.

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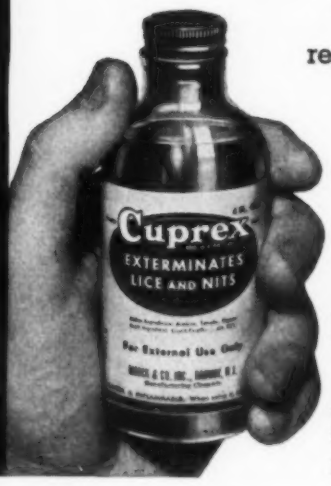

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old Fabiola Hospital of 78 beds and equipped it with complete modern facilities; a new additional wing of 75 more beds is now being added.

They have equipped the Maritime Commission-owned field hospital, now being expanded, to treat a large number of industrial as well as non-industrial conditions near the plants and to provide temporary bed care for serious emergency cases. Complete medical, nursing, ambulance and therapeutic services are combined in this Field Hospital. The income to meet current expenses and to amortize the loan from Mr. and Mrs. Kaiser comes from the industrial medical fees paid by the insurance companies plus the 50-cent weekly subscription fees from employees subscribing to the Health Plan.

Statements made by Dr. Garfield and others associated with Mr. Kaiser indicate that the Permanente Foundation is a non-profit venture. It is anticipated, these people say, that eventually the foundation medical plan will make a profit out of current operations; at that time it is planned that all profits shall accrue to the repayment of the $500,000 advanced by Mr. and Mrs. Kaiser. When that sum has been repaid in full, any further profits will be used for the promotion of medical research, for the rehabilitation of disabled physicians, for the endowment of hospital beds, for the teaching of industrial medicine and for other professional advancement.

Dr. Garfield, according to these statements, is employed under an agreement which allows him to draw up to $25,000 annually in salary. To date, he states, he has drawn no salary from the funds of the Foundation but has actually put into current operating funds some $10,500 of his own money. When and if the profit period of the Foundation is realized, it is anticipated that Dr. Garfield will draw his $25,000 annual salary, will be repaid his $10,500 advance and will have no further share in any profits accruing from the plan.

An inspection of the Permanente Foundation facilities by qualified physicians has disclosed that an up-to-date medical service of unquestioned merit is being performed. Hospital and treatment facilities are excellent and a well qualified and well paid staff of physicians is available for any kind of medicine or surgery. From the standpoint of the present emergency and the rapid expansion in the Richmond area this complete industrial and health service is doing a necessary job which could not have been done nearly so effectively with the medical facilities existing when it was set up.

With the present tremendous loss of physicians to the armed forces it is absolutely necessary to pool and concentrate the remaining medical manpower to cover such industrial needs. The Kaiser plan is one answer. Whether it will pay itself out during the present emergency and what will happen after the emergency when such expansions shrink gradually or rapidly, are questions that remain at present unanswered.

### California Physicians' Service

CALIFORNIA Physicians' Service, a non-profit medical care organization sponsored by the doctors themselves through the California Medical Association, has also entered into the health care of wartime industrial employees in shipyards and other areas. All ethical licensed physicians in California, whether or not they are members of the County or State Medical Societies, are eligible for the staff of C.P.S.

The approach of C.P.S. to this problem has necessarily been different from the approach of Mr. Kaiser, particularly since there is no chance for C.P.S. ever to reach a stage where profits from its service will accrue and will be available to amortize the cost of facilities. There is also the consideration that C.P.S. is a statewide organization dealing with numerous groups of employed persons and responsible for the health of non-war industry employees: Mr. Kaiser, on the other hand, is concerned only with one group of employees, albeit a large one. It is also to be noted that C.P.S. could not have the resources with which to erect new hospitals, and has not considered entering the field of industrial accident services and therefore has not this rich source of income.

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[1] Wolferman, S. J., and Adams, W. F., Industrial Medicine pg. 318-319, July 1942.

**LITERATURE ON REQUEST**

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by

**Joseph L. Fetterman, M.A., M.D.,**
**Assistant Clinical Professor of Nervous Diseases, Western Reserve University School of Medicine, Cleveland, Ohio**

**Foreword by Foster Kennedy**

**Table of Contents**

Foreword . . . Preface

Chapter
I—Introduction
II—Functional Anatomy of the Central Nervous System
III—Brain Function, with some Psychologic Considerations
IV—Diagnosis
V—Early Anatomic Changes and Associated Symptoms in Head Injury
VI—Late Anatomic Changes and Associated Clinical States
VII—Psychoses, and the Role of Trauma in their Causation
VIII—Paresis, Tumors, and Certain Infections and Degenerative States and the Relation of Trauma to Them
IX—Traumatic Lesions of the Spine and Spinal Cord
X—Traumatic Lesions of Cranial and Peripheral Nerves
XI—Miscellaneous Conditions: Traumatic Lesions of the Pituitary Gland; Injury to the Nervous System by Physical and Chemical Agents
XII—The Symptoms of Neuroses
XIII—The Mechanism and Meaning of Neuroses
XIV—The Neuroses Associated with Trauma
XV—Malingering and Psychopathic Personality
XVI—Treatment
XVII—Medicolegal Considerations
XVIII—Neuroses of War
Bibliography
Index

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medical care of the shipyard and other industrial employees on an area basis. Outside the industrial plants its services are being rendered employees and their families residing in the FHA projects built around the industrial plants. C.P.S. operates a medical center in each of the housing areas it serves; staff physicians and nurses at the medical centers give immediate care to the industrial employees and their families, referring to professional members of C.P.S. in the immediate vicinity those cases requiring hospitalization, surgery or more extensive medical care. In each case the local county medical society has consented to this arrangement and a local medical advisory committee has been established.

The FHA adds the monthly charge for C.P.S. services to the rental of the housing units and turns over these collections to C.P.S.

When and if a profit should accrue from C.P.S. services in the housing areas, such a profit must be returned to the subscribing employees and their families in the form of either reduced fees or increased services.

The cost of hospitalization is included in the C.P.S. fee.

### Procurement and Assignment

PROCUREMENT and Assignment Service has been brought into the picture through its responsibility to civilian and industrial populations in preventing too great a loss of physicians to the military forces, and in causing proper redistribution and reallocation of physicians to areas where needed.

The one problem of Procurement and Assignment in this matter is the problem of meeting military quotas and at the same time directing to essential industrial organizations or to areas which are short of doctors, those physicians who cannot qualify for military service but who can give medical care to the civilian population. In its reallocation program Procurement and Assignment operates as an advisory body only; it has no authority to order any physician to change his location.

Early in its existence in California, Procurement and Assignment became aware of the building up by Mr. Kaiser and Dr. Garfield of a staff of physicians for both the industrial and non-industrial medical care of Kaiser employees. The Kaiser staff of some 30 physicians (early in 1942), represented a group of young men, all but two of whom were definitely of military age.

A review of the Kaiser medical staff showed that practically every one of the 30 physicians should be declared "available for military service" because of his age; at the same time, Procurement and Assignment had no intention or desire to break up an established staff which was caring for an important segment of the industrial population.

Complaints had been heard from the medical profession that the Kaiser staff was practising "corporate medicine," that Dr. Garfield has resorted to "piracy" in hiring his physicians, that the whole operation was an unethical one, that doctors eligible for military service were being offered sanctuary and protection from Selective Service. Procurement and Assignment took the attitude, however, that its function had nothing to do with ethics and that its approach to the problem must be from the point of view of the distribution of physicians between military and civilian agencies.

At the same time, Procurement and Assignment put Dr. Garfield on notice that his staff members were vulnerable to induction into the Army by Selective Service because of their low average age. This warning was given for the protection of the staff, to obviate the disruption that might occur if a large part of the staff was classified 1-A by local draft boards and forced into military service.

On the basis of the above reasoning, a program was worked out whereby Dr. Garfield would clear through Procurement and Assignment any physicians who were under consideration for employment on his staff. It was understood that those physicians who otherwise would be available for military service were not to be employed by Dr. Garfield except for a temporary period, while they awaited the issuance of their commissions and orders for active duty.

A second part of this program called for the replace-

ment of any four young staff members every 90 days; replacements were to be by physicians over military age or physically disqualified and rejected for military service. Procurement and Assignment agreed, under this program, to declare "essential" the remaining members of the Garfield staff until the time for replacement of each staff member should come up.

This program was put into operation. Procurement and Assignment has referred to Dr. Garfield no less than 25 physicians who are either too old for military service or have been rejected by the Army. Some of these have been acceptable to Dr. Garfield and have been employed by him; some have been unable to perform the medical duties with satisfaction. Nine of the former members of the Garfield staff have been accepted for military duty and have been replaced by other physicians. The program is somewhat behind schedule at present because Dr. Garfield found it necessary shortly after the start of the program to increase his staff to care for the increasing number of employees who have signed up for the plan, and to cover the expanding program of the shipyards. To accommodate this larger group of employees a 75-bed addition is being built onto the Permanente Hospital in Oakland; priorities for building materials were secured by the Maritime Commission on the ground that service was being rendered to employees of a Commission shipyard.

Today, from the point of view of Procurement and Assignment, the Permanente Foundation is rendering an excellent medical service to Kaiser employees. California Physicians' Service is likewise rendering an excellent health service to industrial employees and their families in the defense housing areas. The problem of Procurement and Assignment now is to see to it that there is not an overlapping, a duplication, of medical care facilities.

### Questions Needing Answers

IN THE case of Richmond, can the Kaiser employees receive adequate medical and hospital care from other physicians in the vicinity?

How wide an area is the residential area of the 85,000 Kaiser employees?

How many civilian physicians are there in that area, ready, willing and able to take on the private medical care of these employees and their families?

Is Dr. Garfield going to expand his plan to include the families of employees? So far he has not done so but it is known that Mr. Kaiser has offered such coverage on previous projects and is likely to do so again.

Is Dr. Garfield going to expand his plan of employing civilian physicians on a part-time basis to give medical care to employees who live outside the reasonable service area around the Permanente Hospital in Oakland? He has already employed one San Francisco physician to make house calls.

Will California Physicians' Service and Dr. Garfield be able to work out a joint program of rendering medical care to shipyard workers and their families?

What solution will be reached where the shipyard employee is paying 50 cents a week for the Kaiser medical service and finds that by living in an FHA housing project he is getting full medical care from C.P.S. for himself and his family? How will the overlapping of medical services in such a case be eliminated for the conservation of resources?

Will there be a further overlapping of medical services if Mr. Kaiser's suggestion of industry sponsoring medical foundations is generally followed on a statewide or nationwide scale?

These are some of the problems of today in regard to the Kaiser service. Entirely aside from considerations of ethical medicine, these problems exist as economic factors in the efficient distribution of medical resources. With military demands for physicians rising higher every day, with industrial employees increasing in number, with the need for a scientific utilization of all medical resources in order to make a little bit of material go a long way, these questions demand an answer.

Bit by bit, these questions are being answered by Procurement and Assignment and by others. Little by little the problems are being clarified, although much remains to be done before the situation is entirely straightened out.

One thing, however, remains certain. Whatever solution to this problem is finally worked out, it must be along lines which will permit the most efficient use possible of all medical manpower.

## NEWS, COMMENT and OPINION

IT IS BOTH the worker's right and his duty to demand health facilities, but "organized labor frequently feels about the company safety program the way it has felt about the company union—that both are designed primarily for the benefit of management."

—WENDELL LUND, quoted by JAMES C. LEARY, *Chicago Daily News*.

DR. W. E. DOYLE, director of Kentucky's Bureau of Industrial Hygiene, said today (*Louisville Times*, February 3) that the opening of the Bureau's new $10,000 laboratory in the annex of the State Board of Health marks two 'very successful' years of industrial hygiene work in Kentucky." Work of the bureau has not been limited to potential health and accident hazards and their evaluation but has included inquiry into medical and nursing facilities, water supplies, sewage disposal, cafeterias, lunch rooms and industrial welfare programs in industrial plants. Among the bureau's achievements is the investigation of all reports of occupational disease and subsequent recommendations for control to the management of industrial plants . . .

EARLY in 1942 (*Louisville Courier-Journal*, February 6) a course in industrial hygiene was offered to juniors at the University of Louisville Medical School, and a similar course was added to the curriculum of the School of Engineering. A division of industrial nursing has been formed as a section of public health nursing in Kentucky, and a registry of nurses interested in industrial cases set up. Ground work has been laid for a post-graduate course in industrial medicine and surgery. Tentative plans have also been made for a dental program for industry through cooperation with the Bureau of Dental Health.

THE role of the Pennsylvania Department of Health and the County Medical Society in Industrial Health, with a Survey of Industrial and Medical Facilities in Luzerne County," and "Industrial Health and Hygiene and the Medical Profession" were topics of papers read by DR. JOSEPH H. SHILEN, director of the Bureau of Industrial Hygiene, State Department of Health, and DR. CHARLES-FRANCIS LONG, chairman of the Commission on Industrial Health and Hygiene of the Medical Society of Pennsylvania, at a meeting of the Luzerne County Medical Society, February 17. Discussion was led by DR. H. A. FISCHER, SR. The Committee on Industrial Hygiene for Luzerne County comprises DR. CHARLES H. MINER, chairman; DR. W. DAVISON, and DR. S. M. DAVENPORT.

—*Wilkes Barre (Pennsylvania) Record*, February 18, 1943.

THERE'S no shortage of rubber-soled shoes at Picatinny Arsenal. The only hitch is workers must hand over ration coupons for shoes which may save their lives but are no asset to any wardrobe. Efforts are being made to have the OPA relax restrictions. Rubber shoes must be worn to prevent static electricity which might cause an explosion.

—Item in *Chicago Herald-American*, March 1, 1943.

DESPITE popular apprehension, there is no evidence that a wartime temperature of 65°F. in the home, office, or school will affect the health of persons who dress properly. Only a few generations ago people lived in temperatures of 55°, but changes in heating systems and weight of clothing have driven the comfort temperature for women up to 76° and for men to 72. The provisions of fuel rationing laws do not

—*Continued on page 186.*

## INDUSTRIAL HEALTH and DISEASE

### The Industrial Worker—His Eyes

THE occupational hazards to the industrial worker are many, but of all of them those which affect his eyes are probably the most far-reaching in their effect upon his life, happiness and livelihood. In spite of this fact many a worker exposes himself to injury and eye infection, day after day. He makes no attempt to protect himself either by the use of mechanical devices or by the intelligent use of safe conduct and medical care. With the steady increase in the number of men and women entering industry the need for better knowledge and better application of this knowledge about the care of the eyes grows daily. This need is recognized by Dr. Leverett D. Bristol, chairman of the Council on Industrial Health of the American Medical Association, who, in a recent report, stresses the immediate necessity for the education of the worker with reference to his own health as the need of greatest importance in an industrial health program.

ALMA EBLING, in *The Sight Saving Review.*

Each worker should himself know how to protect his eyes by recognizing the signs of eye strain and defects, and knowing the particular eye hazards connected with his job. Many industrial firms now provide a pre-employment eye examination followed by periodic tests, but in spite of this it is observed that a worker will often develop signs of eye irritation which he does little to correct or which he neglects entirely until the condition becomes chronic, resulting in not only loss of work hours but loss of wages as well.

In the past years eye protection by management has been directed mostly toward the prevention of injury through accident, dust or chemicals directly connected with the industrial process. As a result, such improved and perfected devices as goggles, shields, face masks, helmets and hoods have been provided. Exhaust systems and better ventilation; intelligent revision of certain processes, such as the installation of the automatic machines, has helped to cut down the number of accidents and the incidence of disease due to dust or fumes. However, there is a long list of other diseases not connected directly with the industrial process, but still growing out of conditions which are part of industry, such as poor lighting or unhealthful working conditions and communicable diseases spread through unsanitary conditions and practices in work places. In the last two types of disease and eye afflictions the causes are less dramatic and the illness often slow in developing, but the effect is just as costly to the worker—lost eyesight or incapacity to work and earn a living. These disease hazards have been neglected by management and worker alike. One way the employee can help protect himself is by early recognition of changes from the normal—know the signs of eye difficulties and then do something about them. Go to the clinic or doctor. Don't wait!

A young mechanic recently developed a bad stye on his right eye. A month previously he had had one on the lid of his left eye. When asked why he didn't do something about it, he said, "I don't have time. I work on the night shift and sleep in the daytime when the doctor has his office hours." He needed medical attention, treatment and advice, not only to cure the present ailment but to find the cause, if possible, and thus prevent further spread of infection. There is no doubt that a worker who is on night shift finds it difficult or inconvenient to go to the oculist or clinic on his off hours, but he should remember that it is going to be much more inconvenient and expensive if the condition is not corrected.

These signs of eye strain and irritation, such as styes, are often slight, but even the slight indication of change from the ordinary should be cared for immediately. The cause may be one of many; some connected with the work and working conditions and others growing out of living conditions. In the latter group such things as loss of sleep, lack of certain essential foods, a sinus infection, a general run-down condition, or actual changes in the visual acuity of the eyes may be the contributing or direct cause. Where the cause is associated with the job being done, it might be due to poor or glaring lighting, poor plant hygiene, especially as related to the toilet or wash-room, or lack of hygiene of the employees themselves.

The first evidence of eye difficulties may be itching of the lids, styes, redness of the lids or eye, burning of the eyeball, tearing and pus in the corner of the eye in the morning, eyelids stuck together after sleep, or light sensitiveness. Headaches, dizziness, and even stomach upsets may be traced to eye strain. Also, extreme and unusual fatigue at the end of the working day may indicate that the eyes are not functioning properly and need attention. These are some of the first signs and warnings and may merely indicate a temporary irregularity, but they are also the first stages of many of the more serious eye diseases, such as trachoma, and should not be neglected.

Taking up first those general ways in which the worker can help in protecting himself from disease, one of the best methods is to get sufficient rest and good food. Sleep and rest are necessary to everyone and the worker who is on an intensive schedule needs plenty. Lack of sleep has been found to lead to inaccuracy and irritability on the job, and lack of rest over a prolonged period makes an individual more prone to mistakes and accidents, and an easy victim to infection. In recent months the newspapers and magazines have carried many articles concerning advice on foods. The good diet is the one which includes plenty of milk and dairy products, whole grain cereal and fresh vegetables, both raw and cooked. The type of food which has been found to be particularly beneficial to the eyes includes carrots, dairy products, butter especially, liver and all others containing vitamin A. It has been observed that many workmen eat sandwiches of white bread, whereas some of the darker, coarser breads contain more vitamins and calories and are just as cheap and healthier than the white variety. It must be recognized that a well-balanced diet is essential and should include all kinds of food, so that the lunch box should carry raw vegetables, such as greens and tomatoes and carrots, as well as sandwiches.

The elimination of all chronic in-

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fections of the nose, ears, sinus and teeth has been found to clear up eye conditions which have frequently caused near-blindness. The presence of such infections, or, for that matter, any infection within the body, is a constant strain and drain on the resources of the entire system. A sinus infection particularly will affect the eyesight and often makes a person think his eyes have suddenly become much poorer than formerly. This may not be the case at all, and as soon as the sinus is cured, the eyesight may again become normal.

Fortunately, the four most common types of eye defects are correctible by the use of glasses. They are:

1. Astigmatism—Irregularity of some part of the eye.
2. Myopia—Near-sightedness.
3. Hyperopia—Far-sightedness.
4. Presbyopia—The reduced elasticity of the eye muscles, usually beginning anywhere between the ages of 40 and 50.

It is possible for a person to have any one of the above-mentioned defects in vision and still be unaware of it until the constant use of the eyes at a machine or the poor light on his work produces headaches, stomach upsets, blurring, fatigue and just plain tired eyes. Corrective glasses should give relief and the older workman should not hesitate to have his eyes examined and procure properly prescribed and fitted glasses. And when he gets them it is important that he wear them.

Most of the larger industrial firms have found it good economy in time to provide effective lighting for the workshop. However, with the many hastily converted plants now in use, the light may not be as well directed as it should be upon the work. The constant motion and jiggling of machinery, or parts of it, for instance, may be the cause of eye strain. Therefore, definite standards for efficient lighting in industrial plants have been set up. Louis Resnick, in his book, *Eye Hazards in Industry*, says: "Any lighting method, natural or artificial, must take into account three factors: sufficiency, continuity, and diffusion. There must be, first of all, adequate window space. In general there are three ways in which to provide window space—by side windows, by skylights and glass roof, and by sawtoothed roof construction. In most plants these three means are combined, according to local conditions, to secure the maximum amount of daylight." He continues: "Even in the plant which is constructed to use daylight to the fullest extent for all the time it is available during working hours there are two conditions which make necessary the installation of an adequate system of artificial illumination:

"1. Short period of daylight during the winter months.

"2. The cloudy and stormy days which decrease the natural light so that the work cannot be carried on without eye strain."

Today, most plants are employed 24 hours a day, which naturally makes efficient artificial light an absolute necessity. The other factor which may cause uncomfortable conditions for the worker is glare. This often is caused by reflection from polished surfaces, windows, or even the piece of work being inspected or polished. Shades should be provided and lights shifted. Poor lighting will exaggerate and excite all eyes with a refractive error (that is, eyes that can be remedied by wearing glasses). Conjunctivitis may be caused by using eyes steadily under poor lighting conditions. The light should be well diffused and not spotty; and eye comfort is a good standard for good lighting.

The other condition which is hazardous to the worker is insanitary toilets and wash-rooms. These are often responsible for the spread of disease within a plant. In most places the old roller-towel has been replaced by paper towels. Plenty of them, plus soap and hot water, should be provided 24 hours each day. The wash-room should be clean and the worker should help keep it that way. The importance of a sufficient number of toilets for the number employed cannot be over-emphasized. Many workers do not realize that door-knobs, flush valves and water faucet handles spread infectious disease. The workman who is careless in the toilet may be exposing not only himself to infection, but others as well. Workers should demand clean washrooms and plenty of them. The incidence of venereal diseases in industrial plants has been found to vary from 1% to 10%. They are highly contagious.

The way to help prevent their spread is by practising decent personal habits, using paper towels and soap and water.

In closing, a few definite suggestions may help you protect yourself from eye disease or difficulties:

Do not rub your eyes with a dirty towel, handkerchief, sleeve, or hand.

When you are hot and sticky, germs, dust and oily substances will readily stick to the eyelids or can be rubbed into the eye itself. This very stickiness creates excellent media for the development of germs.

Do get expert first aid for eyes.

Do not let the inexperienced person fool around with your eyes.

Do use mechanical protection if necessary.

Do use your prescribed glasses if needed.

Do go to the eye clinic or doctor as soon as eye disturbances are noticed.

Do get plenty of sleep, rest, relaxation and good food.

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# Low Back Pain

## —of Industrial Workers—


W. HORACE MEANS, M.D.,
*Lebanon, Pennsylvania*


BACKACHE in industrial workers is a frequent and troublesome entity. Its causes are diverse and the amount of disability is many times out of proportion to the physical findings. The compensation factor adds to the confusion and our diagnosis must be made not only as a guide to therapy but as a basis for an opinion as to compensability. Unfortunately, we doctors as a rule are loath to take the time to get a careful history and make a complete physical examination. A hasty inspection, a diagnosis of sacroiliac sprain, and an application of adhesive support too often suffice. Disinterest on our part drives the patient to the cultist.

It is evident that back pain in industry merits the careful attention of all surgeons doing industrial work. Its economic importance can be realized if we remember that in 1940, in the state of Pennsylvania, 4034 back cases lost 208,311 working days and were paid $449,705 in compensation. In addition, there were the medical bills for these cases and for those who were not injured seriously enough to lose time from work.

In 1941, in a steel plant employing 3700 workers, there were 190 back claims. Nine were cases of muscular strain and sprained joints and lost an average of 15 days; three fracture cases averaged nine weeks. In addition, 116 were classified as strained backs due to injury, but the workers were not injured seriously enough to leave work. Sixty-five claims of back injury were found to be due to nontraumatic causes, as follows:

| | |
|---|---|
| Acute myositis associated with acute infections | 47 |
| Chronic myositis | 5 |
| Postural | 5 |
| Prostatic | 2 |
| Renal calculus | 1 |
| Arthritis | 5 |
| Total | 65 |

In passing, it is interesting to note that a review of the records reveals that during the depression years there were more back cases reported in proportion to the number of employees than in the recent years of increased prosperity. The period of convalescence was longer, too, proving that a good-paying job is superior to prolonged physiotherapy.

*Sprain.*—A sprain is the result of a force applied to ligaments surrounding a joint and may result in tearing the fibers or separating them from their attachments. The joint most frequently affected is the lumbosacral. The symptoms are those of pain, usually severe, muscle rigidity, and deep-seated localized tenderness. There may be swelling over the affected area


Read before the Section on Surgery of The Medical Society of the State of Pennsylvania, Pittsburgh Session, October 7, 1942; published in *Pennsylvania M. J.*, November, 1942.

# IN THE MODERN TREATMENT OF RHEUMATOID ARTHRITIS

## SOLGANAL-B OLEOSUM

SOLGANAL-B OLEOSUM (aurothioglucose), a gold compound of high therapeutic efficiency and low toxicity for the treatment of rheumatoid arthritis. Improvement has been reported in sixty-five to seventy-five per cent of cases. SOLGANAL-B OLEOSUM is administered intramuscularly in regular courses separated by rest periods. Complete information concerning the actions and uses of SOLGANAL-B OLEOSUM* may be obtained from the Medical Research Division. *Trade-Mark Reg. U.S. Pat. Off.

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and the symptoms will be increased by motion.

*Strain.*—A strain is produced by a force which stretches muscular fibers. These fibers are characterized by strength, elasticity, and tone. When stretched beyond their normal limits, rupture of the fibers occurs together with capillary hemorrhages. Normally, with heat and rest, healing takes place quickly and the disability is relatively short. If the muscles have been the seat of previous injury or disease, or if the general system is deficient, a fertile soil for the invasion of infectious processes will result. If this occurs, the symptoms will be prolonged unduly. This is particularly true if proper protection has not been afforded. The symptoms are those of localized tenderness with muscular spasm. There may be referred pain to the inguinal region or to the back of the hips. There may be a list to the injured side to relax the tension.

*Sacro-iliac Subluxation.*—This is described as a painful slipping of the sacro-iliac joint, and occurs as a result of some sudden act of lifting while one leg is straight and the other slips, or it may occur when suddenly rising from a stooped position in which the trunk is quickly twisted. The symptoms are a sudden painful catch in the sacro-iliac region. The patient may not be able to straighten up. If the slipping is relieved by motion, a residual soreness remains. The objective symptoms are a flattening of the lumbar spine, rigidity of the muscles, and lateral curvature of the spine away from the affected side. The patient is usually able to bend forward when sitting better than when standing. Flexing of the affected leg and the Gaenslen sign usually demonstrate the symptoms.

*Subluxation of the Articular Facets.*—These processes will have a tendency to slide, especially when there is an upward pull on the sacrum, such as in lifting, and the symptoms are similar to the sacro-iliac sprain except for the difference in the location of the tenderness.

*Contusion.*—This a a sudden blow on the back. It may produce a deep or superficial bruise and hemorrhage into the muscles. The symptoms are the same as those of a bruise anywhere.

*Fractures of Vertebral Bodies and Transverse Processes.*—Fractures may occur in the bodies of the lumbar vertebrae, but are not attended with the same seriousness due to the absence of cord structure. It is important to recognize a fracture of the body and treat the patient in a hyperextended position in order to avoid subsequent strain and root pains due to faulty alignment. Fractures of the transverse processes occur fairly frequently and are usually associated with muscular strains or contusions. Localized tenderness and x-ray will reveal the amount of damage. The symptoms, however, are usually due to injury to the soft parts rather than to the fractures themselves.

*Nucleus Pulposis.*—In the past few years the diagnosis of intervertebral disk has been increasingly popular and many times unjustified. This condition can occur, but the cause has not been completely determined. Most orthopedic surgeons believe that it is due to trauma. In some cases the symptoms do not develop for months or years after an accident, and in other cases no history of trauma can be elicited. The majority of cases are seen in young adults. The most common location is the fourth or fifth lumbar disk where the sacral and fifth lumbar nerves are compressed. The diagnosis is based on the history of persistent backache, accompanied by sciatic pain. This pain is usually exaggerated by coughing and sneezing and is often associated with a diminished or absent Achilles tendon reflex. Paresthesia may occur and is important in localizing the lesion. X-ray confirmation can be obtained by using lipiodol or air. The former has the disadvantage of being an insoluble substance which should not be allowed to remain in the body; the latter does not give entirely satisfactory contrast films. Dandy[1] makes the diagnosis on the history and examination alone and explains the numerous negative operations by describing a concealed variety of disk.

Ober[2] deplores the increasing tendency to ascribe all chronic back conditions to a herniation of the disk and states that its removal does not always relieve the lame back. To the average industrial surgeon, the problem is still a difficult one. Personally, I believe that no one should be subjected to a laminectomy without painstaking study and competent consultation.

*Non-traumatic Causes.*—The most frequent non-traumatic cause in the afore-mentioned series was acute myositis associated with acute infection. The origin was always sudden and usually the worker blamed a lift which had occurred several days or weeks before. Fever, rapid pulse, a reddened nose and throat, and a vague distribution of pain usually made the diagnosis obvious.

Seaman[3] has emphasized the frequency of acute backache due to prostatitis and the infrequency with which it is diagnosed. A mere examination of the prostate, he states, often relieves the pain immediately. Other urologic causes which should be mentioned are the referred pain from a calculus or a perinephritic abscess. Essential diseases of the spine, such as malignancy, tuberculosis, and arthritis, are more apt to cause chronic pain and can be differentially diagnosed only by x-ray.

Among the orthopedic causes of chronic backache are spina bifida, spondylolisthesis, scoliosis, and malalignment of articular facets, but by far the most frequent cause under this heading is that of poor posture. Unfortunately, good posture is not a national asset, even in young people. In industrial workers, advancing age, hard work, overweight, pronated feet, and strain from faulty sitting all produce a chronic strain which most frequently manifests itself in the lumbar area. Normally, the anterior curve of the lumbar spine brings these heavy vertebrae and the sacrum almost into line with the center of gravity and thus affords a strong and stable support for the superimposed weight of the body. If an alteration of the normal line occurs, throwing the body forward above the pelvis, a strain is placed on the lumbosacral muscles and the abdominal fasciae.

Spasm of the muscles and tenderness on the tips of the transverse processes where the abdominal fasciae are attached are common physical findings in this type of backache. In an analysis of 468 cases, Gill[4] found that 314 were due to chronic mechanical strain; 64 of these were irritated by minor traumata, but were prolonged by the underlying cause. As he points out, it is essential that a back with normal structures should be used in accordance with the mechanical laws of its design, and even more essential in a back in which the factors of safety have been lessened by faults of architecture or by preceding injury or disease. Modern design in auto manufacturing has eliminated a lot of chronic backache we used to see a decade ago, but modern design in beds with box springs and soft mattresses has been responsible for a surprising number of morning backaches.

The relationship between trauma and disease is clouded with doubt and controversy. There is an almost universal fixed belief among the laity that a pain in the back must be due to injury. On the other hand, some insurance companies will deny compensation if there is a suspicion of disease. It is the physician's difficult duty to decide whether trauma has aggravated a pre-existing disease or whether a convalescence following an injury has been prolonged by an accompanying disease. That an injury can light up a latent tuberculosis of the spine or cause a malignant tumor to grow rapidly must be admitted. Likewise, an osteomyelitis may be instigated by trauma. Fortunately, these cases are rare and several premises are necessary before trauma can be blamed; that is, the injury must be well defined in the history, it must have been localized to the part affected, and have been sufficiently severe to produce deep tissue injury. The time factor between the accident and the onset must be characteristic, that is, in osteomyelitis it will be only a few days, while in tuberculosis it will be six weeks to six months.

The condition which gives us the most trouble is arthritis. This cannot be produced by trauma alone. However, one of the most frequent pictures of chronic back pain is that in which the history reveals vague pains for years and complete disability following a comparatively minor injury. In such cases the man

is usually of middle age and has worked hard. His back will show signs of stress and strain as evidenced by the x-ray. The vertebral bodies will be lipped and there will be hypertrophic changes. The loss of elasticity makes such a back susceptible to injury and even a moderate twist may snap a brittle ligament. When this happens, the severity of the symptoms and the length of disability will be out of proportion to the cause. However, if there is a period free from symptoms following the accident, this means that the effects of the trauma have disappeared. Any recurrence of symptoms after the free period is apt to be part of the normal course of arthritis. Arthur Steindler sums up the situation as follows:

"The determination of the effect of trauma on a case of arthritis is dependent upon (1) whether the injury was adequate and directed to the parts involved, (2) elimination of injury to the soft parts in order to explain the persistence of symptoms beyond the time when simple traumatic effects usually disappear, and (3) the determination as to whether the arthritic changes are general or localized."

In discussing the aggravation of disease by trauma, Earl McBride states that the factor of injury may be considered responsible for only whatever temporary disability it has produced as an aggravating factor, and that it can hardly be held responsible for the entire period of disability.

## History

NO ONE would deny the importance of the history in disease of the upper portion of the abdomen, but few of us are willing to take the time to get an adequate description of a back injury. It is not sufficient to record that the patient, while working at such and such a plant, lifted something heavy and pain flew into his back. We must know what he lifted, how much it weighed, and what position the patient was in. We must know how soon the pain developed and where it was located, whether it was sharp or dull, referred or not. Thus, if a man describes a sudden sharp pain in the lower part of his back while lifting from a stooped position, and if he can continue his work for the rest of his turn, but finds the next morning that his back is stiff and sore, we can be almost sure that he has had a muscle or ligament tear. Again, if, with a rotatory lifting maneuver, he experiences a sudden, sharply localized pain that causes him to assume an abnormal posture and prevents him from doing further work, a lumbosacral or sacro-iliac subluxation can be expected.

If, however, a patient complains of a back pain which started days or weeks after a lift, the effect of trauma becomes questionable. Since the history is so important to us, that given by the patient should be checked with the employer and other workmen. The past medical history particularly in regard to previous attacks, focal infections, and chronic symptoms, is important.

## Examination

THE physical examination should be complete. Examination of the back may localize the trouble, but if an infected prostate or bad feet are overlooked, we may fail to find the cause. The patient should, therefore, be stripped when examined and in a good light. To save time and to insure accuracy, an outline of a routine back examination can be printed or typed on a card and the findings checked as the examination proceeds.

ROUTINE BACK EXAMINATION

Name Age Height Weight

I. History: Date of onset of pain
Part affected
Date and description of accident
Was he doing his regular job?
Did anything unusual occur?
Prior back trouble?
Cold or rheumatic pains recently?

II. Posture:
List? Scoliosis and where
Lumbar curve Feet

III. Motions: Standing Sitting
Forward
Backward
Lateral
Rotary

IV. Position:
(a) Supine
Length of legs Atrophy
Rotation of hip joint Lasegue test?
Gaenslen test
(b) Lateral
Ober test
(c) Prone
Points of tenderness
Muscular rigidity
Ely test

V. Neurologic examination:
Reflexes Sensation

VI. X-ray examination

Even with the data thus obtained, it may be difficult to make a diagnosis or decide the relation of trauma to the symptoms. This may be particularly true in old cases and those suspected of malingering, and hospitalization and further study may be necessary. Local anesthesia, by relieving symptoms, may aid in localizing the trouble. As Thomson[5] states in his excellent article on examination of the back, "After a careful survey, it is possible for the examiner, whether or not he has full understanding of the interpretation of his findings, to at least recognize the fact that if he found actual abnormal changes interpretable as due to low back pathology, it behooves him to take advantage of every possible means available, including consultation, to determine the cause and correct the condition."

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## Absenteeism in Great Britain

ABSENTEEISM among war workers has constituted a serious production problem in all countries. With the increasingly acute man-power shortage which dominates the current industrial scene, the loss of production caused by absenteeism can no longer be made good by expanding the labour force of any undertaking; it must be met by efforts to cut down absences from work to the irreducible minimum. To this end, the Ministry of Labour and National Service in Great Britain has recently published a leaflet, *The Problem of Absenteeism*,[1] containing suggestions for combating absenteeism effectively which are of interest to all countries where absenteeism is a menace to a total war effort.

## Causes of Absenteeism

INVESTIGATIONS have shown that the causes of absenteeism are common to all factories. It is rare to find that any special cause exists peculiar to one establishment, although, naturally, the incidence of the various causes varies from one factory to another in accordance with local circumstances, such as transfer facilities, the proportion of married women employed, etc. Common causes of absence from work are (a) sickness and injury of the worker or of some member of the family for whom the worker has to care; (b) shopping difficulties; (c) the requirements of the family and home (cleaning, meals, care of children, etc.); (d) lassitude and fatigue due to long hours and long journeys to work or both; and (e) "feelings," such as depression over the blackout, lack of general morale, etc.

Of the psychological causes of absenteeism, perhaps the most significant is lack of real interest in the job and a lack of conviction of its urgency and importance in the war effort. A tremendous gulf has been created between those who know and those who do not know what the plant is contributing. Frequently even foremen do not appreciate the importance of their department in the undertaking's work and in the country's effort.

It is too readily assumed that workers generally are concerned only with the money incentive, whereas experience shows that the workers in general respond in increasing degree to the incentive of interest when they are made aware of the part their particular job plays in the final product.

Finally, understanding of absenteeism involves appreciation of the tremendous sacrifices made by large numbers of workers in accepting destruction of their home life. Investigators reported, for example, that:

The matters dealt with under any "welfare" effort become very trivial when compared with a person's home

From *International Labour Review*, February, 1943.

[1] The leaflet states that the great majority of absentees either have what appears to them to be a good excuse or "are merely guilty of carelessness or indifference."

life. A married woman with a house, a husband, and children, already has a full-time job which is difficult to carry out in these days. Yet thousands of them are working long hours in factories . . . If they can carry on with a mere half-day per week off in the ordinary factory hours they are achieving something marvellous. It is time somebody said more about women's effort on these lines, and more about the arrangements which ought to be made to enable them to carry on . . . Men's home lives are disorganised by the fact that their wives, daughters, parents, other relations and neighbours are all going to work or because they have been sent right away from their families to work. These major facts must be taken into consideration in forming opinions on absenteeism and in seeking remedies. They should not be confused with "domestic difficulties" but recognised as a tremendous sacrifice made by an enormous number of workpeople to help the war effort.

### Suggested Remedies

IN FIRMS scheduled under the Essential Work Orders, absence from work and persistent lateness without reasonable excuse are direct offences against the law, but "the proportion of absenteeism for which legal proceedings are the only appropriate remedy is small in relation to the total."[1] It is stated emphatically that a solution of the problem of avoidable absenteeism is more likely to be found by those establishments which look for a solution within themselves than by those which tend to rely more on external powers of discipline or punishment. This was recognised under the Essential Work Orders by providing for reference of cases to the appropriate works committee of the factory or other joint body (where one exists) before prosecution is undertaken.

The Ministry of Labour suggests, first of all, that a real effort by industrial management to attack the psychological causes of absenteeism "is the greatest single contribution that can be made to a solution of the problem." It is expected that the joint production committees will be useful along these lines, but their work can be supplemented by informal talks by foremen, personnel managers, welfare officers, and others in daily contact with the workers.

Secondly, the Ministry suggests that management can make another contribution by planning hours of work for individual workers or groups of workers with some regard to their personal circumstances. At present, hours are too often decided for the factory as a whole, regardless of whether or not they can reasonably be expected to be observed by all the workers—by married women with young children, by workers with one or two hours traveling each way, etc. The result is occasional absenteeism and a decline in general morale. Much greater flexibility is needed, therefore, in organizing working hours. A good deal more could be done by redistributing the work and/or the labour force of a factory so that those who clearly need special working hours would be so employed as not to disorganise the work of others. Alternatively, a rota system might be arranged whereby each worker would be entitled to one day off per week apart from Sunday.

It is further suggested that in each factory, one person of senior status (a personnel or labour manager or welfare supervisor) and capable of "an understanding approach" should be given responsibility for dealing with all absences. The same person should establish coordinated procedure for dealing with applications for leave of absence. Secondly, the extent of absenteeism, together with its causes, should be analysed. The Ministry of Labour provides a model form of record card for absences, to assist firms in assessing their absenteeism and in dealing with it. There is one card for each worker (different colours for men and women), which is completed with a chronological record of hours planned and hours absent, an analysis of the stated causes, a monthly summary, and a record of the warnings issued.

Suggestions are also given for follow-up action on the absence record cards. Thus, if the rate of sickness is high in any particular department, the welfare or medical officer should analyze the sicknesses giving rise to absence to see whether any production process or hours or diet or other cause which can be remedied is responsible; and if a particular worker has a high rate of sickness, medical examination can often disclose the root of the trouble. In the same way, a high accident rate requires detailed investigation and appropriate countermeasures. For absences with reasonable excuse, investigation will often indicate suitable administrative action; local transport may be improved, more nurseries for children may be provided, shopping plans can be made, etc. Absence without reasonable excuse, the only type subject to penalty under the Essential Work Orders, can often be overcome, either by the official dealing with absences or by the pressure of opinion of the offender's fellow-workers, through the appropriate works committee to whom the case is referred. Every opportunity is given a worker to correct his fault before prosecution action is begun.

Last, but by no means least, the Ministry's leaflet declares that it is of primary importance that managements, in their efforts to deal with absenteeism, should maintain close contact with the workers' representatives. The plant's record of absence and all relevant data should be placed before the works committee or production advisory committee, so that the latter may be able to cooperate intelligently and wholeheartedly in reducing absenteeism to the lowest possible level. The workers' representatives have a special responsibility for convincing the thoughtless minority that absence without good cause interferes with the war effort and is grossly unfair to the great majority of their fellow-workers who do their full share despite inconvenience.

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## Epidemic Kerato-Conjunctivitis

*—"Shipyard Eye"—*

CLIFFORD KUH, M.D.,
*Berkeley, California*

SINCE September, 1941, when the epidemic of the kerato-conjunctivitis appeared in San Francisco Bay area, there have been occasional outbreaks. Reported cases at this time are relatively mild, and acute symptoms may last a few days instead of several weeks, as was the experience in 1941. Although popularly known as "shipyard eye," cases are by no means confined to shipyard workers.

The onset of the condition is usually sudden. Outstanding symptoms are a sensation of irritation and scratching in the eye, marked lacrimation, slight photophobia, some blurring of vision, and moderate dull pain in the eyeball. Pain and soreness in the preauricular area on the affected side are common symptoms. Many patients also complain of the eyelids sticking together in the morning on awakening.

Physical examination shows the presence of varying degrees of inflammation and hyperemia of the bulbar and palpebral conjunctiva. In severe cases the bulbar conjunctiva is characterized by extreme, glassy edema, and occasionally subconjunctival hemorrhages are present. A thin membrane is sometimes found attached loosely to the palpebral conjunctiva, or lying in the lower cul-de-sac. Neighboring lymph glands and the preauricular gland on the affected side are swollen, and tender in most cases. In some patients who, at first, had only one eye affected, the condition later extends to the other eye.

Some of the individuals who have contracted this condition have developed multiple minute opacities of the cornea. In some cases, these are not sufficiently opaque to reduce visual acuity appreciably. However, in other cases there has been a distinct impairment of vision, but the ultimate prognosis for vision is good.

The following precautionary measures have been recommended to plant and shipyard physicians, nurses, and executives to prevent the spread of eye disorders in their various establishments:

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A statement by the Bureau of Industrial Health of the California Department of Public Health, Berkeley, California, December, 1942. Published in *California & West. Med.*, January, 1943.

1. Separate examination and treatment rooms for all eye cases.

2. Provision of medical, nursing or first-aid personnel to work in the eye unit only, and not in the general dispensary or elsewhere in the plant.

3. Thorough washing of hands on part of physicians and nurses within or without the plant before treating next patient, and, if instillations into eye are used, separate eye droppers for each patient with sterilization of droppers after use.

4. Assignment to each worker of personal protective equipment for his exclusive use, such as goggles, respirators and masks, and thorough sterilization of such equipment before transfer to another worker. The placement on a special machine of a pair of goggles for general use of all workers, as is sometimes done, should definitely be discontinued.

5. Instruction of employees in personal hygienic measures, particularly the avoidance of rubbing of eyes with hands; for, in this way, tools, door knobs, etc., may become contaminated. Precaution to be taken at home to prevent the spread of the disease to members of the family, such as use of separate towels and frequent washing of hands, should be emphasized.

6. Removal of the patient from work until he has completely recovered from his conjunctivitis. It is believed this latter measure will reduce total man hours lost by entire plant personnel.

Therapy apparently does not influence the course of the disease, but may give symptomatic relief. It is generally agreed that the use of strong antiseptics is contra-indicated. Iced compresses, applied for 15 minutes every two hours, give more comfort than hot compresses. Constant covering of the affected eye from onset of disease is beneficial. Sulfathiazole or sulfadiazine ophthalmic ointment (5%) is used to prevent secondary infection. Roentgen therapy, irrigation with boric acid or saline solutions, instillations of 2% neoprontosil and other measures have been tried. In the presence of widespread epidemic, it has been suggested that a guard at the entrance gate of a plant, who would bar all workers with "red eyes," might be considered.

Recent research incriminates a virus as the causative agent,[1] probably imported by travel from Hawaii. Incubation period is probably five to 12 days. It is believed that close contact and direct transfer are necessary.[2] Unknown factors of susceptibility presumably play an important role.

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## Twelve Golden Industrial Rules

DONALD V. BAKER, M.D.,
*Medical Director, Lever Brothers, Cambridge, Massachusetts*

ALL NURSES in the industrial branch of the profession should remember these 12 golden rules concerning problems peculiar to women employed by industry:

1. On the average their height is less than that of men by several inches. Thus, distances from the floor to the work bench must be decreased to insure less backache and to encourage better posture.

2. Hands and feet are usually smaller than those of men and a woman's arm span is less. Safety-heads and machine guards must be set more closely so that fingers will not be mangled or amputated.

3. The muscles of the body, especially the feet and legs, have lower fatigue limits. They should never be allowed to reach the point where tiredness opens the door to an accident. Varicose veins should be protected from trauma by aluminum shin guards worn under the trouserette.

4. Women's manual strength is less than that of men. They should never be exposed to the lifting of heavy weights without adequate help by their fellow workers. All must be taught how to lift by bending at the knees rather than at the waist.

5. Women's skin is notoriously more sensitive; of a finer texture, and more open to contact dermatitis and irritations from industrial exposure. Protective skin creams should be used when industrial solvents and even bland dusts come in contact with hands or arms. The so-called winter eczema which follows cold weather and frequent hand washing, is best combatted, at the expense of the management, by a simple hand lotion—such as glycerine and rose water.

6. The hair of women is longer—a constant danger or hazard where machine parts are in operation. Nets must be worn while at work.

7. As far as production is concerned, physical appearance on any job is not of primary importance. Women must be made to sacrifice their esthetic desires and avoid the wearing of jewelry or unsafe clothing. They possess 16 hours in which to indulge ideas along that line every day.

8. At the present time women are not as adept as men at purely mechanical labor. They know less about protecting themselves from the perils of machines, and must be taught that a moving machine has no brains and is unable to tell the difference between their finger and the metal it was intended to shape or to cut.

9. After an accident in their department women may be more intensely excited than men. Another accident may be avoided if the individual reports immediately to the doctor or clinic. It is often necessary to send an injured woman to the clinic with some one or two girls acting as aides. Remember that these aides should be told to return promptly to their machines, thus reassuring their department that the well-trained clinic personnel has taken charge and proper treatment is being given. Production continuity is paramount.

10. Women decline to wear sufficient clothing so that warmer rooms are needed for them, otherwise the efficiency of their work will suffer. Fuel and material shortages may force them to wear heavier garments.

11. Married women are now being hired by most firms. Our own rule is to accept them for the duration, if their husbands are in the combat forces. When the war is over, the wife may continue her work but not for over three months. Pregnancy is certain to present a problem many times—already has done so in my clinic. The Massachusetts Statutes permit a prospective mother to work at safe gainful employment until two weeks before term, and to resume one month after her baby has been born. Subterfuge may be used to obtain a position by misdating the last period. I know of no way to avoid the hiring of an already pregnant woman, other than the expensive Zondek-Aschheim test which is usually accurate by the third week. Most firms would choose to avoid such costly tests and a very early pregnancy would be missed anyway. The problem then boils down to the question of how long should employment be permitted. My personal opinion is for not over six months, with work resumption one month after confinement. Her job may need a change to fit this condition and the nurse and physician should recommend it as soon as the diagnosis is established.

12. I do not believe that women gossip any more than do men. Rumor comes as often to my attention from a department of men as from one in which women predominate. We are in a global war. The only safe subjects about which women's conversation may be free are those of clothing, cosmetics, the month's best seller, the current moving pictures, or that universally harmless subject — the weather of the past day or week.

From *R.N.*, for January, 1943. DR. BAKER included these points during the lecture course of the New England Industrial Nurses' Association in November, 1942.

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HANDICIPPED persons are being hired in increasing numbers. In 1942, the local offices of the U. S. Employment Service placed 91,396 handicapped workers, an increase of 72% over 1941 and 230% over 1940. During the last quarter of 1942, 30,347 handicapped placements were made, nearly four times the volume placed in the corresponding quarter of 1940. In the past two years, every quarter has seen a sizeable increase over the corresponding quarter of the year before; half of these increases were two-fold or more. The handicapped were placed in all types of occupations and at various skill-levels.

## NEWS, COMMENT and OPINION

*—Continued from page 177.*

guarantee an indoor temperature of 65° but assure only a fair share of the available supply. These regulations by themselves do not assure the same degree of comfort in all homes unless each owner makes efforts to reduce fuel needs by use of insulation and by raising heating efficiency.

—CONSTANTINE P. YAGLOU, associate professor of industrial hygiene, Harvard Medical School, quoted in *Boston Post*, February 15.

PROCEEDINGS of Industrial Hygiene Foundation's Seventh Annual Meeting, one of the most valuable publications the Foundation has issued, are now in the mails. Included are sections on "More Manpower Through the Reduction of Absences"; "Putting Women, Older Men and the Physically Handicapped to Work"; and "Fatigue in Wartime Industry—Hours of Work, Rotation of Shifts." Also included are practical discussions and reports on the prevention of dermatitis, health hazards in the use of grinding wheels, further studies of aluminum powder in combating silicosis, action of magnesium on the lungs, keeping score on toxic materials and processes in the plant, and the industrial feeding program.

DR. OTTO P. GEIER, in charge of medical matters for Cincinnati Milling Machine Company, and Chairman of the Committee on Industrial Health of the Academy of Medicine, presided at a conference of members of the Academy held at the Oakley plant of Cincinnati Milling Machine to discuss matters of industrial health, with particular reference to absenteeism. Among the speakers were DR. ORLEN J. JOHNSON, of A.M.A. Council on Industrial Health, and DR. DAVID W. HEUSINKVELD, of the Ohio Medical Society's Committee on Industrial Health.

THE feminine hairdo and machinery are a bad combination. In an ordnance plant a woman operating a barrel-turning machine leaned too close and her hair was pulled around the barrel, and a large clump of it was torn from her head. She spent days in the hospital recovering from the wound and shock.

—*Industrial Hygiene Digest.*

HENRY KAISER recently told the Senate special (Truman) committee investigating the war program that union competition to organize his shipyards is costing far more production man-hours than absenteeism; meetings of from 100 to 200 workers are held regularly at his yards during working hours to decide to which union (A.F.L. or C.I.O.) the men want to belong.

THE health work covers three main fields: (1) fitting workers into jobs they can do without too much risk; (2) guarding their health from industrial hazards; (3) teaching them the fundamentals of sanitation and food-handling which prevents epidemics. Science is creating new compounds so rapidly that medicine is continually meeting new sources of illness resulting from workers associating with the substances. The medical organization here lists the fumes of 62 chemicals and 17 dusts which are hazardous. Really the number of dangerous fumes is much larger, due to combination of some of the 62 with still other chemicals. If each caused a distinct disease or illness, the medical problem would be much easier. But many cause symptoms which are almost exactly alike. The military doctors have to set up methods for quickly spotting the one chemical, dust or other cause among possibly 200. Great private industries, the Public Health Service and medical science all have been at work on these problems for years. They started when doctors puzzled as to the golden colors of the skins of gold-beaters. . . . The sanitation program here might surprise a college graduate. It deals with flies, cockroaches, rats, mice, dishwashing, food handling, spread of bacterial infections, tuberculosis, personal cleanliness and venereal diseases. Not a word is new. Many families have practiced all these health rules for generations. But to any cross-section of the American population, such as the employees of the world's largest industrial organization, the practices contain many new pointers. These practices, if followed generally, would sharply reduce most of the epidemics common in the United States.

—From an AP from Patterson Field, Ohio, in *Chicago Daily News*, March 9, 1943.

"INDUSTRIAL MEDICINE" to most people connotes only treatment of injuries received in mills or offices; dramatic medical work over a man who has been critically injured by a huge machine. But industrial medicine is concerned with prevention. Authorities estimate that $100,000 worth of equipment is needed for every worker. Hence management of the losses sustained when a worker is absent from his job. Prevention of illnesses that might cause a man to lose time at his machine is one of the major concepts of today's industrial health picture. Modern methods of war depend almost as much on the economic resources of a country as on the size and skill of its fighting forces. The full development of the economic resources depends upon (1) a large supply of skilled and unskilled workers; (2) an adequate supply of machinery and material; (3) the health of the workers. This important third factor can become the bottleneck of an otherwise perfect production system. It is essential to give due consideration to hours of work, factory conditions, sanitation, ventilation, heating and lighting, and many other concepts. Proper care of minor injuries has been and is being stressed. Modern surgical methods have reduced the number of permanently disabled workers and have contributed to the saving of many lives. Pre-employment physical examinations are now routine in most plants. The periodic examination thus becomes the next phase in this evolution of industrial medicine. Medical research is constantly being carried on by an increasing number of physicians and research workers in the toxic effects of substances used in manufacture. The item of fatigue is a vastly important one. The highest incidence of accidents occurs before the noonday rest and near the end of the working day. Mid-morning lunches and mid-afternoon snacks have been helpful in cutting accidents. Heat-sickness, from poor ventilation and over-heating of factories, has been eliminated in many causes by giving salt and sugar tablets to the workers. Notable advances have been made in ventilation; the latest plants are completely air-conditioned. Proper illumination also is an important factor; a great deal of work is still being done in this field. Industrial medical supervision daily is becoming a more integral part of modern industrial organization.

—*Peoria, Illinois, Star*, February 28, 1943.

Miss Alberta Brizius, R.N., Servel, Inc., Evansville, Indiana, illustrates how the hair should be covered. Left—Incorrect; Right—Correct.

### Dermatitis

OF RECENT years it is repeatedly said that occupational dermatitis is of great importance. With this I cannot agree. According to my experience, skin inflammation usually leads to no actual loss of time from work, or that of but a few days, and very rarely more than a few weeks. It is probably because of frequency that so much importance is attached. Without doubt, many chemical agents cause dermatitis every day. This is true of gasoline, turpentine, cleansing agents, acids and strong alkali. However, these are conditions usually of minor severity. If at all major, the patient has knowledge of the cause, can tell specifically when the accidental exposure occurred, and there is little question about the validity of the claim. Treatment is ordinarily a simple matter of protecting the damaged skin, the application of soothing remedies until replacement of destroyed tissues occurs, and avoidance of further accidental contact. Thus, in my opinion, the recent emphasis placed upon dermatitis in industry, because of its frequency, is no more well founded than to consider minor lacerations and contusions as an outstanding medical problem. The cause, prevention, and cure of both are well known, with prevention resting largely in the competent hands of the safety engineer. Chemical dyes have come into particular prominence, but strangely through allegation of occupational poison most frequently when the dye has been fixed within the fabric used. Study has repeatedly shown that personal cleanliness adequately prevents, provided the mistake is not made of utilizing powerful soaps, themselves irritants. Dermatitis from all sorts of chemical agents of doubtful validity is claimed. In the majority of cases when careful study follows, proof is lacking. The dermatitis is often limited to but few in the working group. This in itself must cast doubt on the allegation. Dermatitis is an extremely common condition throughout the world, caused by many things besides occupation. Diseases of the skin are so complex that many doctors feel very much at a loss when dealing with them. The doctor not infrequently concludes industry to be at fault based on very limited evidence indeed. Time after time, upon reference to an expert, non-industrial classification is made. Even so, the vast majority of those suffering with skin irritation of industrial origin respond promptly to soothing treatment and removal from the causative agent. Thus the average medical cost and the duration of disability are low. Diagnostic studies in effort to avoid unjust claims are generally more expensive than the cost of the claims themselves.

—From "Industrial Disease and the Insurance Carrier," by ROSCOE N. GRAY, M. D., in *Rocky Mountain Med. J.*, March, 1943.

## THIS MONTH

*—Continued from page 4.*

experience, because she is now a consultant for the Office for Emergency Management—has kept DR. GIBERSON from writing more pointedly about the applications of psychiatry in the Federal government. The word 'government' may be substituted with propriety, in most cases, wherever she has used 'industry' ". . . . BRITISH experience with absenteeism discloses that "the proportion for which legal proceedings are the only appropriate remedy is small in relation to the total." Undoubtedly it is equally small here—too small in final analysis to justify, on any sensible remedial basis, either the bureaucratic hullabaloo about it or the ponderous punitive measures being agitated in high places. In much of this there is more than a suspicion of "confusion worse confounded" definitely, with point and purpose. The unavoidable absenteeism is largely a matter of medicine; the avoidable is a matter of morale. Both have their laws, and statutes are no part of them. Fortunately, the trend, as we go to press, is toward solutions by managements, rather than by legislation. Secretary of Labor Perkins now believes that management and labor can work it out among and between themselves. They can, and no doubt they will. . . . NEWS, COMMENT and OPINION confirms that industrial health is "news." This month it is a little more accurately and much more understandingly reflected in the national cross-section. Notable are (1) a short article in *Peoria Star*, February 28, and (2) a longer one in *Chicago Daily News*, March 9, the latter describing industrial medicine at Patterson Field, Ohio. . . . REMINDER as to the WAR CONFERENCE: make reservations early!

## MANUFACTURERS

THREE new multivitamin and mineral dietary supplements, affording complete flexibility of dosage in fractions of multiples of the daily allowances recommended by the Food and Nutrition Board of the National Research Council, have recently been announced by E. R. Squibb & Sons, New York. The vitamins are supplied in Engran Capsules and Pargran-V Perles; calcium and iron in Pargran-M Capsules.

UNDER the title "Basic Nutrition in Prophylaxis and Therapy," Horlick's Malted Milk Corporation has prepared a new and attractive brochure for the physician, the dietitian and the nurse. After a brief resumé of current thought on basic and accessory food elements, the booklet discusses the role of Horlick's Fortified and Horlick's Malted Milk Tablets in the dietary management of common, clinical conditions. An interesting feature is the tabulation of nutritional values of foods. These food charts have been made more practical by providing the protein, fat, carbohydrate, mineral composition and caloric values in terms of *normal servings* rather than percentages.

HOW American medicine has met many challenging problems imposed by this global war was described by Albert Q. Maisel, war correspondent and author of "Miracles of Military Medicine," at a banquet for employees of Ciba Pharmaceutical Products, Inc., celebrating the presentation of the Army-Navy "E" to the company. He said that American medical men now serving on many fronts are constantly developing new techniques and improving those used by their comrades-in-arms of the United Nations. At the end of the war they will translate these into civilian practice. Other speakers included Brig. Gen. S. U. Marietta, commandant, Walter Reed Hospital; Rear Admiral Charles M. Oman, commandant, Harriman, N. Y., Rehabilitation Center; Col. Harold W. Jones, librarian, Army medical library; Pharmacist's Mate, first class, Edward Bykowski, severely wounded when his ship, the U.S.S. Vincennes, was sunk at Savo Bay; and Wing Commander N. Timmerman, DSO, DFC, Royal Air Force. Vera Zorina, film star, and military representatives of Great Britain, Cuba, Fighting France, Greece, the Netherlands, Norway, China and Russia were among guests of honor. Earlier in the day Gen. Marietta presented the "E" flag to J. J. Brodbeck, president of Ciba, and Sam and Carmelo Terranova, father and son who represented employees. Capt. Reynolds Hayden (MC), medical officer, Third Naval District, presentd "E" pins to Helen Danow, Grace Furneld, Helen Hanlon, Gertrude Hayes, Harry Bosshard and Rheinhold Uebele, acting for all employees. Lowell Thomas was master of ceremonies.

SHARP & DOHME, pioneers in the development of dried blood plasma, and producers in their laboratories in Philadelphia and nearby Glenolden not only of plasma but also of many other disease-preventing, pain-relieving and life-saving medical supplies for the armed forces, were awarded the Army-Navy "E" for excellence in production on Wednesday, February 10. Since both the pharmaceutical and biological laboratories received the award, two ceremonies were held. At both, the "E" pennant was presented by BRIG. GEN. HUGH JACKSON MORGAN, Chief Consultant in Medicine, Office of the Surgeon General, U. S. Army. The pennants were received on behalf of the company by J. S. ZINSSER, President. COMMANDER E. L. BORTZ, U.S.N.R., of the U. S. Naval Hospital, Philadelphia, presented the individual "E" pins to representatives of the more than 2,000 employees. The pins were accepted

on the employees behalf by M. C. CALHOUN, president of the Sharp & Dohme Employees Organization. EUGENE F. WAGNER, secretary-treasurer of the company, presided at both ceremonies. GENERAL MORGAN, in presenting the "E" pennant, termed the company's "pioneer work" in connection with dried blood plasma "one of the outstanding contributions of biological manufacturing."

BRISTOL-MYERS Company has prepared for free distribution a wall chart on the subject of foot health and care. It is entitled "Why Do Feet Hurt—What To Do." With the shifting of thousands of people from ordinary civilian life to the more strenuous life of farm or factory, many are having considerable trouble with their feet due to longer hours of standing. Painful aching feet induce poor dispositions which in turn slow up work now so necessary for our war effort. Many industrial physicians have found these charts of real value in increasing the efficiency of plant employees through a better knowledge of the proper care of the feet. To readers who believe a chart of this sort, prominently displayed so it will contact large groups of employees, will be of value, Bristol-Myers will be very glad to send one with their compliments. If more than one chart is needed, let them know and they will accommodate as long as their supply lasts. Write for a Foot Health Chart to the Professional Department, Bristol-Myers Company, 630 Fifth Avenue, New York City.

FOUR smart models of fashion-engineered hats for women in industry have been created for Mine Safety Appliances Company by Lilly Daché. These offer complete hair coverage and better head safety for women, and a lift to morale through finer appearance. They are easy-fitting and comfortable; cool; moisture-proof; easily cleaned with soap and water. Each style fits all heads. The four types: the Daché Turban—a plastic mesh turban model; two styles of the Daché Helmet—with transparent acetate solid top and snood, or with laced split-top and snood; and the Daché Cap—a plastic mesh model with high crown and broad visor. For further details write Mine Safety Appliances Co., Braddock, Thomas and Meade Streets, Pittsburgh—requesting Bulletin No. CJ-1, just published.

MINE SAFETY Appliances Company's aluminum model Dustfoe Respirator is now available in an all-plastic model, approved by U. S. Bureau of Mines. Known as Clear-Vue Model Dustfoe, it is an efficient, compact, lightweight respirator made of transparent plastic—durable, odorless, noncorrosive, and a non-conductor of electricity and heat. The transparent construction makes possible the inspection of the filter for proper insertion and seal without removal from the respirator. A plastic catch on the filter case locks positively in place only when the filters are in the correct position. The unit is comfortable to wear and gives approved protection against all pneumoconiosis-producing, nuisance, or toxic dusts. The self-adjusting face piece has a new form-molded sponge rubber face cushion. An Army-type exhalation valve provides immediate drainage of condensation from the face piece. The Clear-Vue requires little maintenance. It can be completely disassembled without tools in a few seconds. With the exception of the single filters which permit a fresh new filter with each cleaning, all parts of the Clear-Vue are inter-changeable, and can be washed and sterilized. Headband hardware of the unit is also of plastic. The unit is comfortable to wear and permits unobstructed downward and sidewise vision. Goggles or head coverings can be worn without interference. Request Bulletin CM-6.

A NEW type of protective clothing known as Ply Garb, is announced by the Milburn Company, Detroit, manufacturers of Ply creams and liquids for the prevention of industrial dermatitis. In both design and material, Ply Garb sleeves and aprons are an innovation that provides an exclusive combination of advantages for workers exposed to water, acid, fire, alkalis and chemicals of all kinds.

Ply Garb was designed to supplement the use of Ply creams and liquids in operations where the exposed skin is subject to abrasive action or where the protection of clothing is of prime importance. Of vital significance is the fact that Ply Garb is flame-proof, preventing serious injury from spontaneous magnesium fires, and other hazardous manufacturing operations. Made of featherweight, but extremely tough plastic laminated cotton cloth, the new sleeves and aprons offer maximum comfort and freedom of movement. The sleeves feature special air vents to guard against excessive perspiration. The aprons are available in both full-front and split-front models, and adjustable shoulder straps make it easy to fit them to the individual. The garment may be fastened around the thighs and legs in a manner similar to cowboy chaps. Ply Garb fabric is sturdy enough to resist tears, snags on rough surfaces and cracking. It is flexible enough, however, to resist wear and afford complete comfort. The aprons and sleeves are made for both men and women, with each detail of design and manufacture complying with the recommended specifications of the U. S. Department of Public Health for the most effective protective clothing.

SURGEON-GENERAL Thomas Parran of the U. S. Public Health Service pointed out in August, 1940, that no major military operations were possible in the tropics without quinine or the equally potent synthetic, Atabrine. When that statement was made, Winthrop Chemical Company, a Sterling subsidiary, had already completed research initiated at the outbreak of war in 1939, to free the U. S. from dependence on foreign sources for the intermediates required in manufacturing the synthetic drug. Under the direction of Dr. A. E. Sherndal, plant superintendent, supplies of raw materials of domestic origin were located, processes developed for transforming them into the necessary intermediate products, and steps devised for carrying out the Atabrine synthesis. Winthrop produced the first American Atabrine on a commercial scale in October, 1940. Production was rapidly expanded after Pearl Harbor. During 1941, Winthrop again doubled its own production schedule, and by contract provided for additional production facilities; so that at the year's end, the annual rate of production was more than 800,000,000 tablets, or 16,000% above this country's normal requirements. When all production units now authorized are operating at capacity, American production will be at the annual rate of more than 1,600,000,000 tablets—enough to treat 106,000,000 cases of malaria. This amount should be sufficient not only for the armed forces of the United Nations, but also for much of the civilian populations of these countries. The major portion of 1941 production went to the Army, Navy and other government agencies, which have flown large shipments to Brazil to protect workers on rubber plantations, as well as to other countries. Whereas the price of Atabrine was $66.66 per 1000 tablets in 1933, when introduced in the U. S., the cost to the government is today $4.50 per 1000—or 6¼ cents per case of malaria, as compared with 27 cents for quinine. Recognition came to Atabrine during the year as the XIIth edition of the U. S. Pharmacopoeia, issued in November, included it under the non-proprietary name of quinacrine hydrochloride. The National Research Council conducted an investigation to determine the quality of the American product and found that it did not differ from that produced in Germany.

# *Speeding Epithelization*

## IN BURNS

*X-ray burn on finger of surgeon.*

*Complete healing after 7 weeks' treatment with White's Vitamin A and D Ointment, in spite of the local deleterious effect of frequent scrubbing-up.*

CLINICAL experience has definitely established the value of the topical application of vitamins A and D, usually in ointment form, to promote healthy granulation and epithelization in burned areas.

Unlike coagulant therapy with tannic acid and its modifications, the "cod liver oil method" of treatment has been observed to reduce infection, to destroy no epithelial elements and to minimize the need for skin grafting. Furthermore, it is applicable to burns of any area—the face, hands, feet, perineum, axilla or groin, locations in which the constricting effect of coagulant therapy contraindicates its use. This method of treatment "produces more rapid wound healing than other methods — offers an effective method of treatment applicable to the most severe major burns of all types and superior in certain respects to other methods of local burn therapy, especially in third degree burns."[1]

## White's VITAMIN A and D OINTMENT

Supplies the vitamins A and D, derived from fish liver oils, in the same ratio as found in cod liver oil and in a suitable, lanolin-petrolatum base. The ointment possesses a pleasant odor and is free from excessive oiliness. At ordinary temperature White's Vitamin A and D Ointment will keep indefinitely without becoming rancid.

Available in four convenient sizes: 1.5 oz. tubes, 8 oz. and 16 oz. jars, 5 lb. containers.

Ethically promoted — not advertised to the laity.

1. Hardin, P. C.: Cod Liver Oil Therapy of Wounds and Burns, South. Surg. 10:301, 1941.

**WHITE LABORATORIES, INC., NEWARK, N. J.**

● **A product of Ciba research introduced after years of extensive laboratory and clinical study.**

# PRIVINE* HYDROCHLORIDE

## *New Powerful Synthetic Vasoconstrictor*

▶ ***PRIVINE Hydrochloride*** acts quickly to clear nasal congestion due to Colds, Hay Fever, Rhinitis, Ethmoiditis, and Rhinosinusitis. Its markedly prolonged duration of effect is outstanding . . . in most cases the vasoconstriction lasts from 2 to 6 hours.

▶ Great care has been exercised in preparing ***PRIVINE Hydrochloride*** solutions to meet all requirements for modern nasal medication[1]. The isotonic and buffered solution restores the normal pH of the nasal mucosa and maintains ciliary activity.

▶ ***PRIVINE Hydrochloride*** (Brand of Naphazoline) applied either by drops or nasal spray is preferred by physician and patient due to its lack of local or systemic side effects. Available in 0.1% solution in 1 oz. bottles and also 0.05% in 1 oz. bottles for children. Literature and samples on request.

1. Fabricant, M. D.: "Nasal Medication," Williams and Wilkins Company, October, 1942.

*Trade Mark Reg. U. S. Pat. Off.

**CIBA** *Pharmaceutical Products, Inc.*

SUMMIT, NEW JERSEY